FCDOP Standards Overview 2020

- **Program Standards Review**
- Florida County Digital Orthoimagery

AGENDA

- **Summary of FCDOP Program**
  9:00am-9:15am Brett Wood FDOT

- **Role of the FGIO. Current & planned statewide initiatives.**
  9:15am-9:30am Parker Hinson FDEP

- **Professional Services Statute**
  9:30am-9:40am Charles Russell FDOR

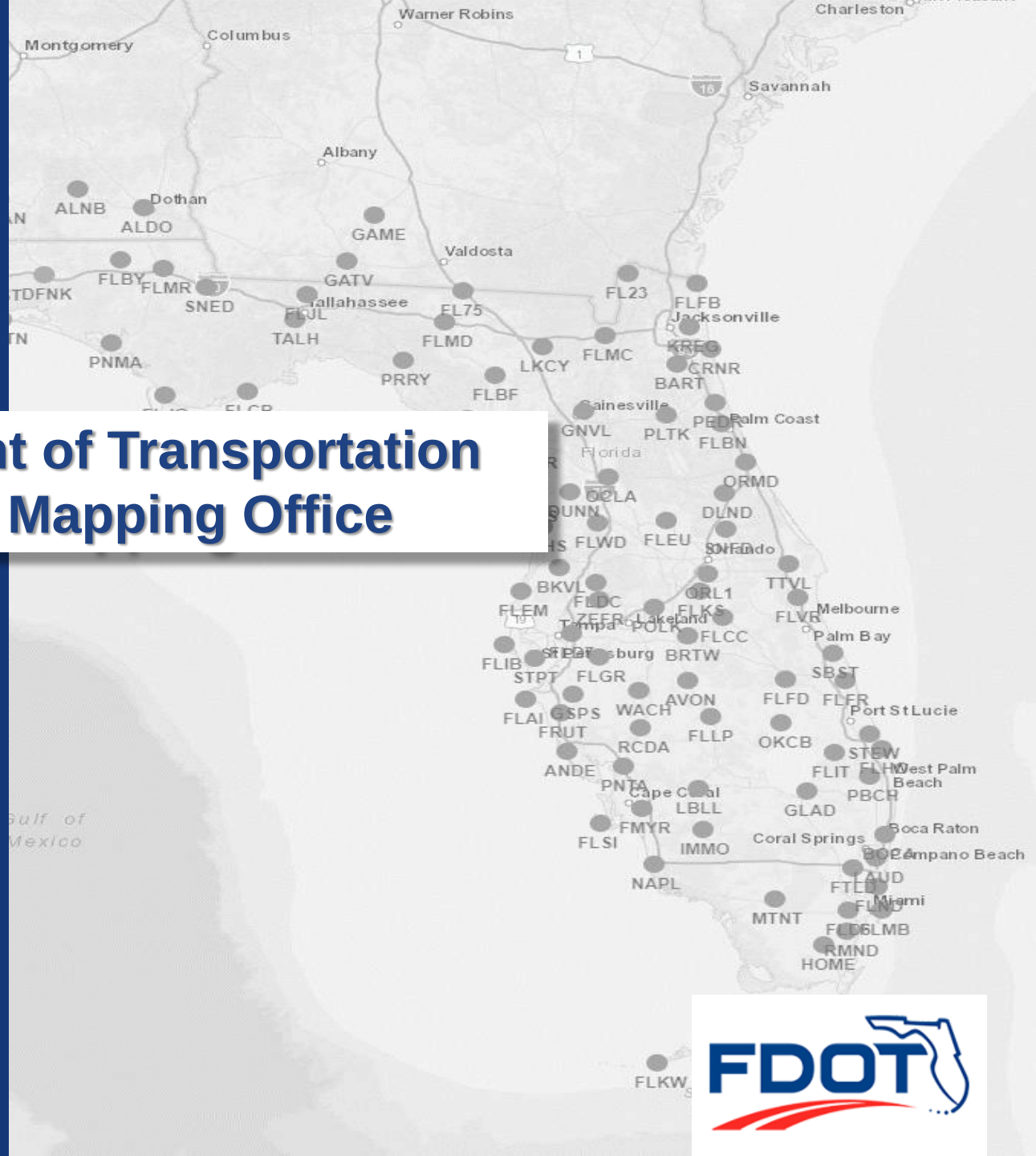
- **FCDOP 2020 Standards**
  9:40am-9:50am Maurice Elliot FDOT

- **FCDOP Deliverables, File specifications**
  9;50am-10:00am Joseph Michela FDOT

- **Data usage statistics. Potential applications for FCDOP data.**
  10:00am-10:15am Ryan Rittenhouse/Nichole Mittness FDOT

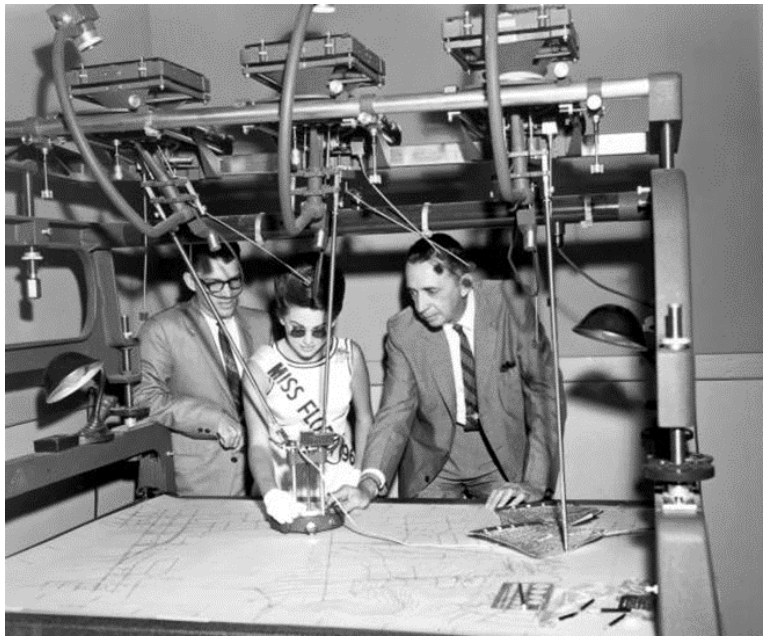
- **Question & Answer**
  10:15am-10:45am

Florida Department of Transportation
Surveying and Mapping Office



Brief History

- **1946 -** Jon Beazley joins the FDOT and begins to utilize Photogrammetry for county mapping.
- **1961 –** FDOT purchases a Wild 6-inch focal length RC8 aerial camera. Photogrammetry begins flying aerial mapping missions using Governor's plane.
- **1968 – 1970** Photogrammetry Division becomes Topographic Bureau and adds Remote Sensing group.



- **1975 –** FDOT enters into inter-local agreement (O.R.B 741 Page 158) with the Florida Department of Revenue (FDOR) to map all Florida Counties. This is currently on a 3-year cycle.

  - **373.012 Topographic mapping.—**

In order to accelerate topographic mapping in this state by the United States Geological Survey, the Department of Transportation is hereby authorized and directed to set aside, to pledge, and to make available annually out of its State Transportation Trust Fund the sum of $30,000; and the Board of Trustees of the Internal Improvement Trust Fund is hereby authorized and directed to set aside, to pledge and to make available annually out of the Land Acquisition Trust Fund the sum of $10,000; and the South Florida Water Management District out of its funds to be derived out of the proceeds of special assessments of its flood control taxes, is authorized and directed to set aside, to pledge and to make available annually such sum as may be required to meet the needs for topographic mapping of areas affecting said district.

- **1977 –** NASA closes its aerial photography section and donates all its equipment to FDOT.
- **1979 –** Jon Beazley retires from FDOT State Topographic Office.
- **1980's –** Remote Sensing Group is phased out.
- **1995 -** State Topographic office becomes Surveying and Mapping Office (SMO). Under state mandate FDOT begins downsizing. Districts outsourcing most aerial surveying work.
- **2003 -** Aerial Surveying purchases an Intergraph Digital Mapping Camera (DMC). This ends film processing and moves Aerial Survey into full digital image workflow. Image Services section if formed and work begins to scan aerial photo archive and the Aerial Photo Look up System (APLUS)

- **2012 –** Florida Orthophotography Business Plan

An ongoing annual investment of $2.9 million will support a Statewide Orthophotography Program for Florida that will yield $31.1 million in annual benefits.

Table 6. Benefits Reported by Counties for Orthoimagery (5 Year Totals)

Benefit Type	Responding Counties Total Population	Responding Counties Total Benefits Reported	Per Capita Benefits
Staff Productivity/Labor Savings	5,944,435	$ 2,195,000	$ 0.3693
Revenue Increase	3,056,636	$ 4,655,000	$ 1.5229
Reduced Redundancy	6,845,873	$ 1,985,000	$ 0.2900
Asset Management	3,089,576	$ 690,000	$ 0.2233
Economic Development	1,169,869	$ 1,440,000	$ 1.2309
Avoid New Costs	2,239,759	$ 1,375,000	$ 0.6139
Capital Projects	4,074,161	$ 1,730,000	$ 0.4246
Infrastructure	4,514,729	$ 2,630,000	$ 0.5825
Field Service Efficiencies	5,032,491	$ 2,425,000	$ 0.4819
Joint Funding	6,631,419	$ 3,325,000	$ 0.5014
Total Per Capita 5 Year Benefit		$ 22,450,000	$ 6.24
Annual Per Capita Benefit		**$ 4,490,000**	**$ 1.25**
Projected Annual Benefit for Entire State	**18,553,974**	**$ 23,157,970**	

The projection suggests that a reasonable expectation for benefits in county governments across Florida of a statewide orthoimagery program is in excess of $23 million per year. Thus the ***potential*** annual benefit to the citizens of Florida from a well run statewide orthoimagery program may range between $12.4 million and $31.1 million. The low estimate of benefits is the sum of benefits reported by survey respondents. The high estimate builds upon the respondent reported benefits to project benefits to all county government. In both cases the benefit forecast can be viewed as conservative since it does not include potential benefits to private firms and individuals or a larger sampling of non-county governments.

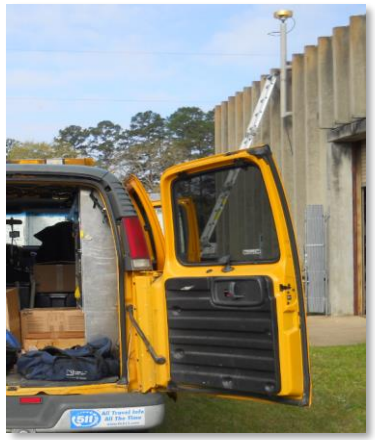
- **2016 –** Statewide Topographic Mapping Support Contract established. Aerial Mapping section becomes Mobile Surveying & Mapping.

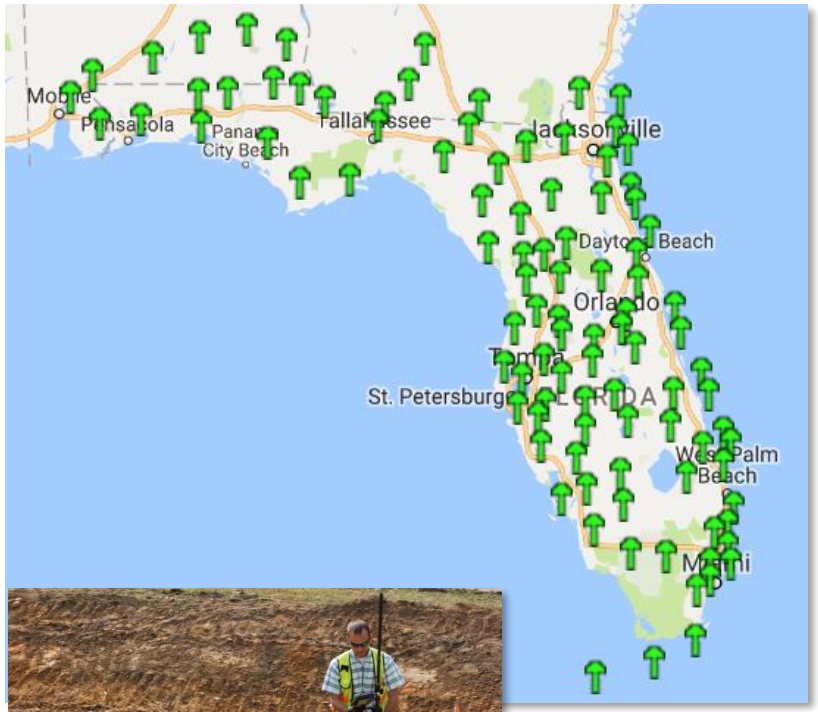
- **2017 –** Final in-house aerial mapping collections performed. FDOT Aerial Mapping aircraft transferred to FWC. CIM office established

State Topographic Mapping Support Contract

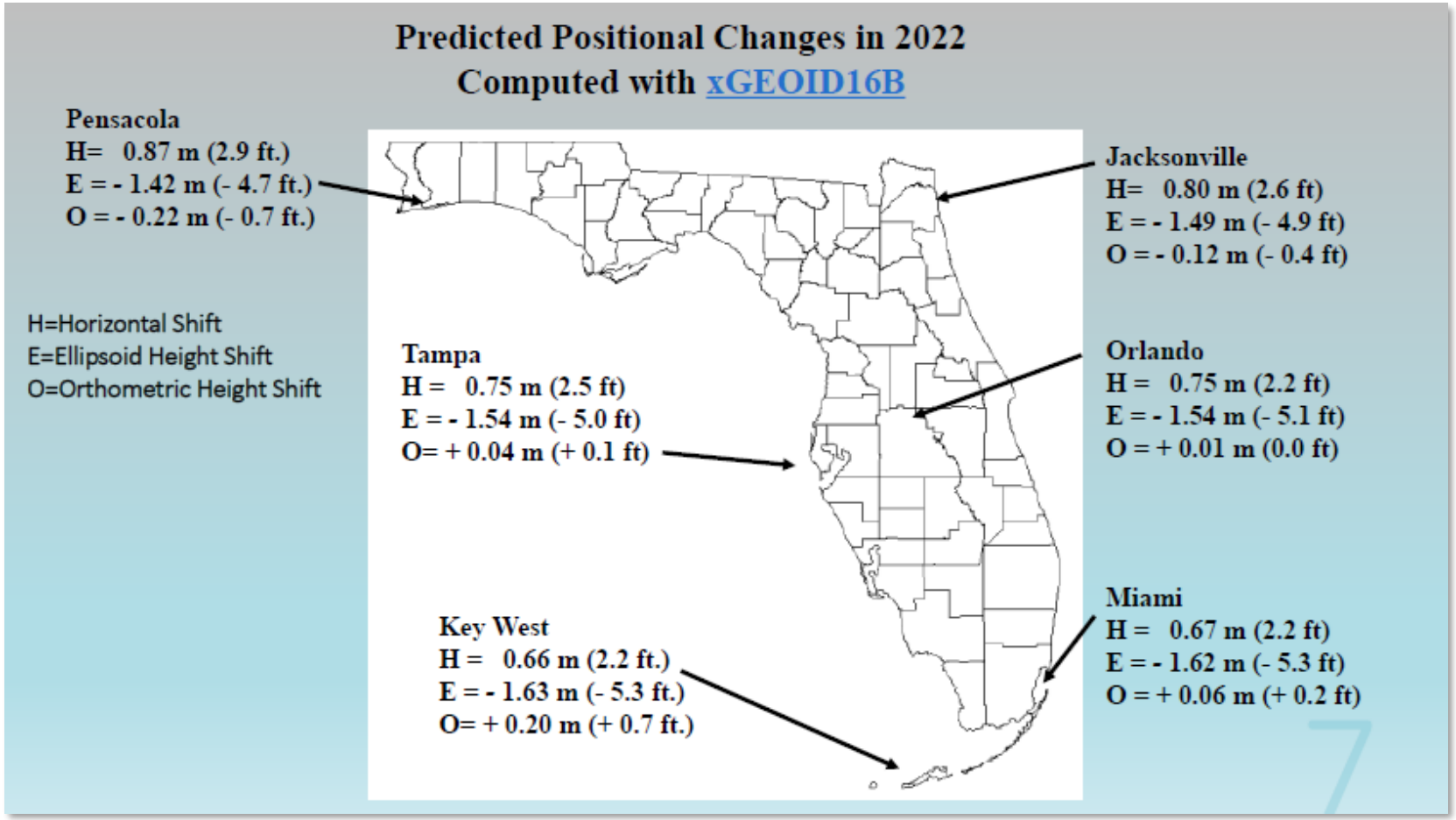
- Five year 5 Million dollar continuing services contract
  - With the advent of new mobile surveying & mapping technologies the Department has established a consultant contract for collection and a bulk of production of topographic mapping. The Department provides some production but mainly focuses on technical support and quality assurance.
  - Two consultant teams
  - Broad spectrum remote sensing services
  - Mobile Surveying & Mapping production support on Department projects as needed
  - Support statewide topographic mapping of Florida
  - Florida Digital Orthophotography Program (FDOP)
  - Coordinate with FDOR and Water Management Districts to provide statewide coverage on a 3-year cycle
  - Coordinate with other agencies, and pursue cost savings opportunities

CSMO: Florida Permanent Reference Network (FPRN)





National Geodetic Survey Datum of 2022



The Florida Geographic Information Office

2020 Florida Digital Orthoimagery Program

- March 4 -

Overview

ABOUT THE FGIO

GIS AND THE LEGISLATURE

STATE & FEDERAL INITIATIVES

FGIO HUB WEBSITE

STATEWIDE OPEN DATA PORTAL

The Florida Geographic Information Office

- The FGIO works to support the State's efforts to improve the quality of Geographic Information Systems (GIS) in Florida through agency coordination and collaboration with the larger GIS community.

- The Office strives to elevate the quality and use of geospatial sciences and technologies to support the diverse and critical missions of Florida's state agencies.

The Florida Geographic Information Office

FY 17-18

- Established the FGIO
- Agency for State Technology (AST)
- Now a Division (DST) at Dept. of Management Services

FY 18-19

- Housed at FDEP for one year

FY 19-20

- Legislature chose to have the FGIO administered by FDEP

FGIO Florida Geographic Information Office

The Florida Geographic Information Office

- Kimberly Jackson, GISP was appointed as Florida's Geographic Information Officer in 2019.
- She has over 25 years of experience in the Florida GIS community and served as co-chair of the State GIS Workgroup.
- Serves as the state representative with the National States Geographic Information Council (NSGIC)

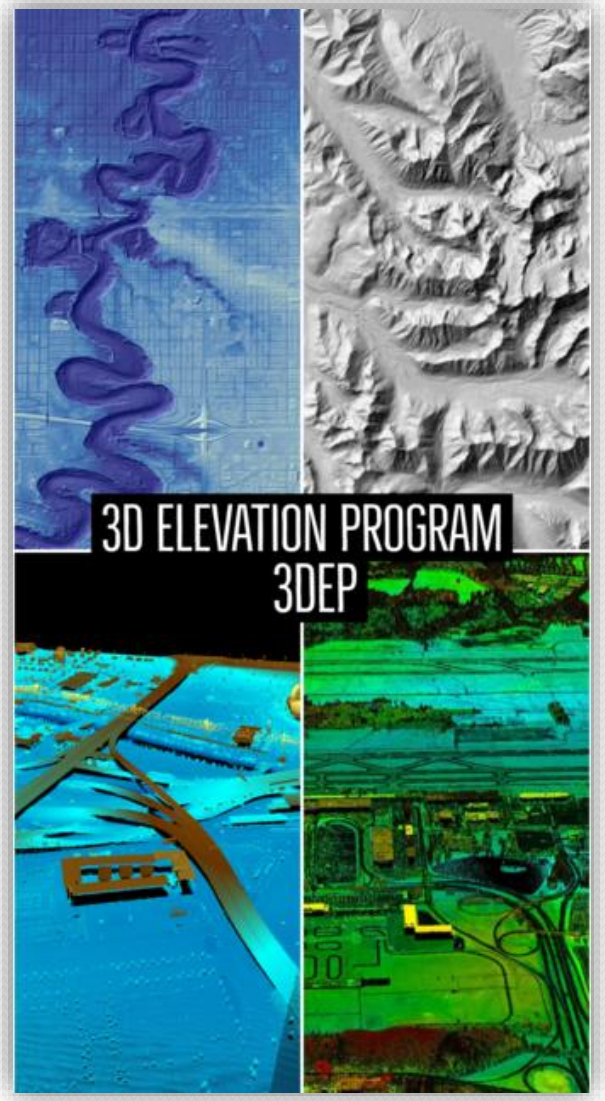
FGIO
Florida Geographic Information Office

FGIO Initiatives

- Federal -

3D Elevation Program | 3D Nation

- Managed by the U.S. Geological Survey (USGS) National Geospatial Program
- The goal is complete acquisition of nationwide lidar by 2023
- Would provide the first-ever national baseline of consistent high-resolution elevation data



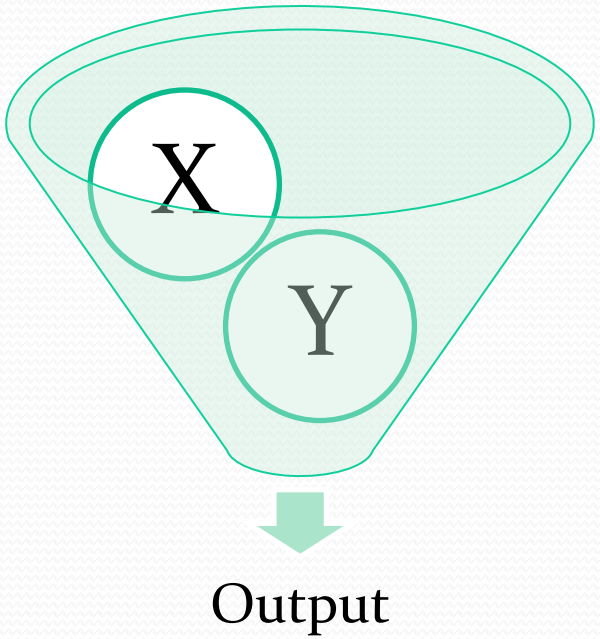
Referenced from USGS 3D Elevation Program

FGIO Initiatives

- Federal -

2020 Census

- The FGIO and FWC are working with US Census Bureau to verify boundaries and provide assessment of its impact on Florida.
  - FWC assisting with off-shore boundaries (3 miles)
  - GIO assisting with county boundaries
- FGIO participating in discussions regarding the new 'differential privacy' algorithm



FGIO Initiatives

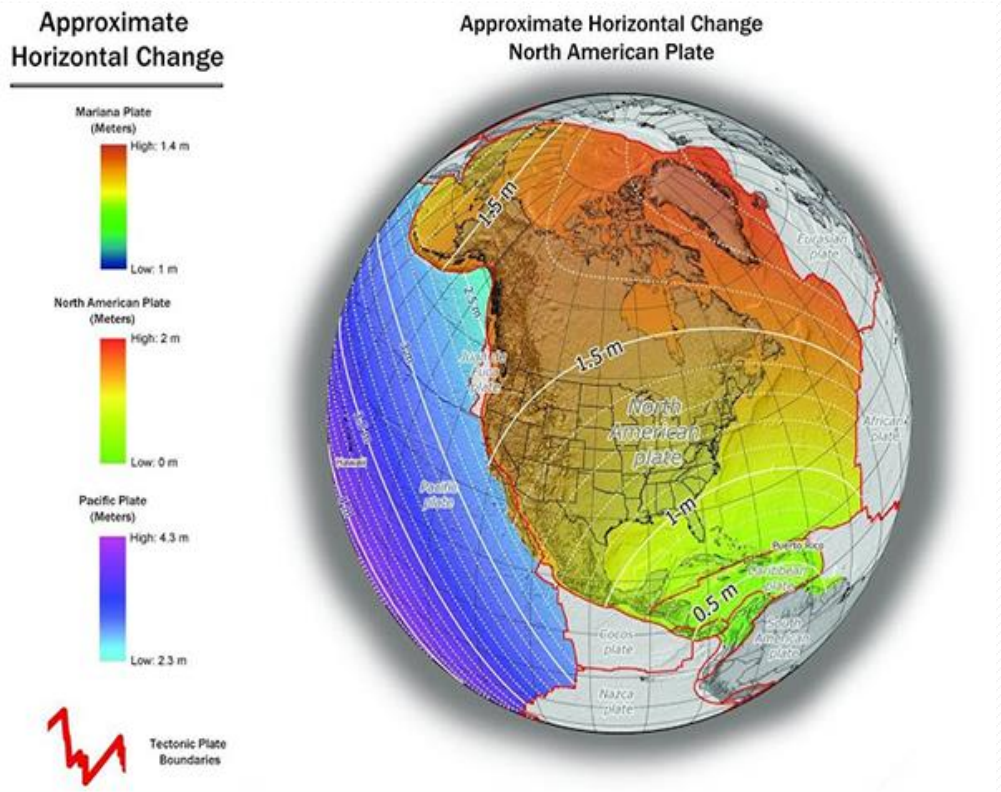
- Federal -

Datum 2022 + Statewide Planes

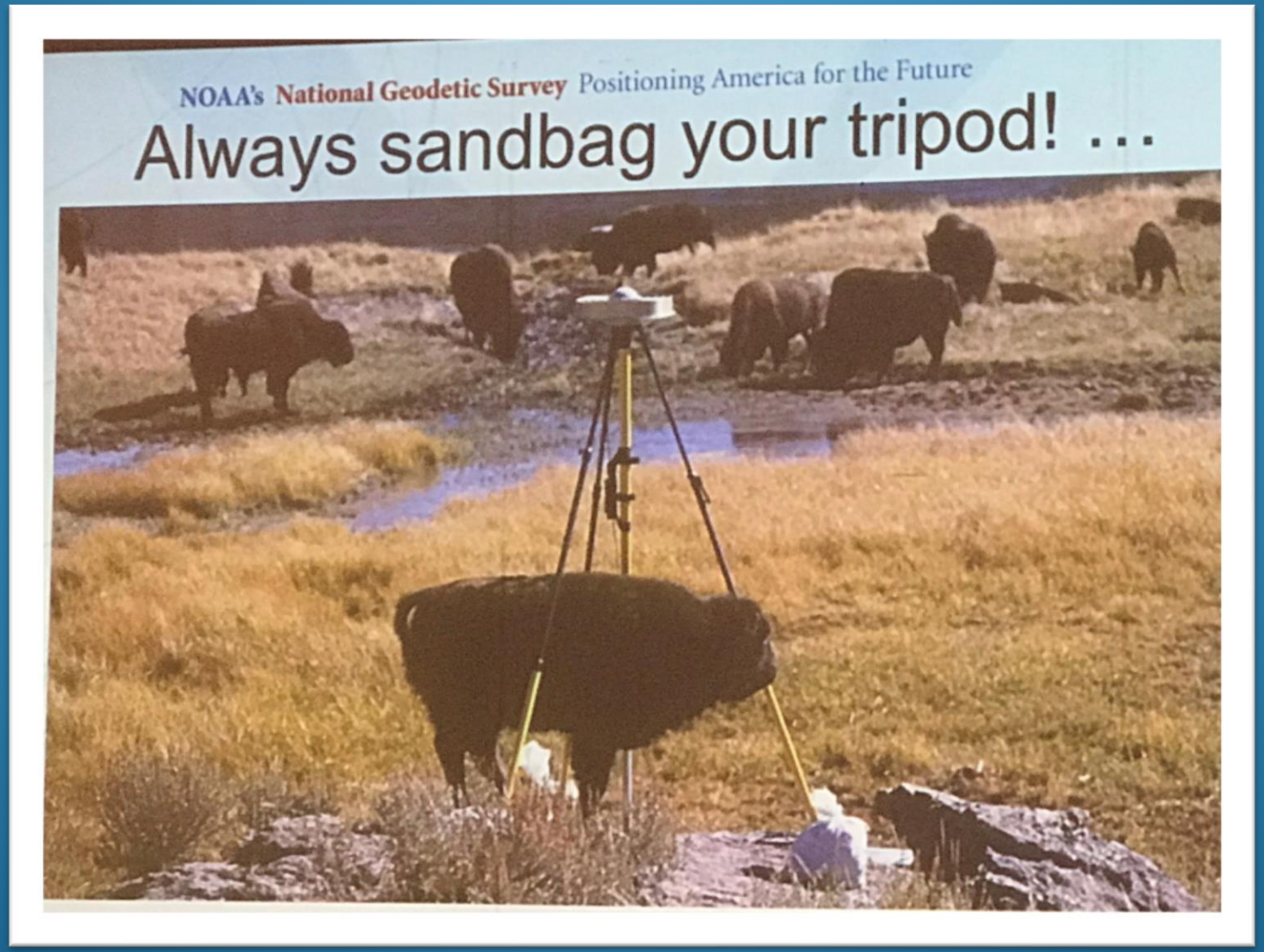
- What to expect? Simply, your coordinates will change

NGS Benchmarks

- Goal is to assist the National Spatial Reference System (NSRS) and prepared for the NSRS modernization in 2022



One Problem Florida Doesn't Have…



FGIO Initiatives
- State -

Florida Statewide LiDAR

- *From the funds provided in Specific Appropriation 2564, **$15,000,000** of nonrecurring funds from the General Revenue Fund is provided to the Division of Emergency Management to **competitively procure professional LiDAR mapping services for the production of a complete and accurate 3D map of the entire state** for use in emergency management, infrastructure planning, agriculture and forestry, among other purposes.*

- *The 3D map must meet the requirements of all state agencies. The Division [FDEM] shall consult with the Department of Transportation on the procurement. The division shall submit quarterly project status reports to the Executive Office of the Governor and the chairs of the Senate Appropriations Committee and the House of Representatives Appropriations Committee.*

Referenced from FDEM's *Florida Statewide LiDAR - StoryMap*

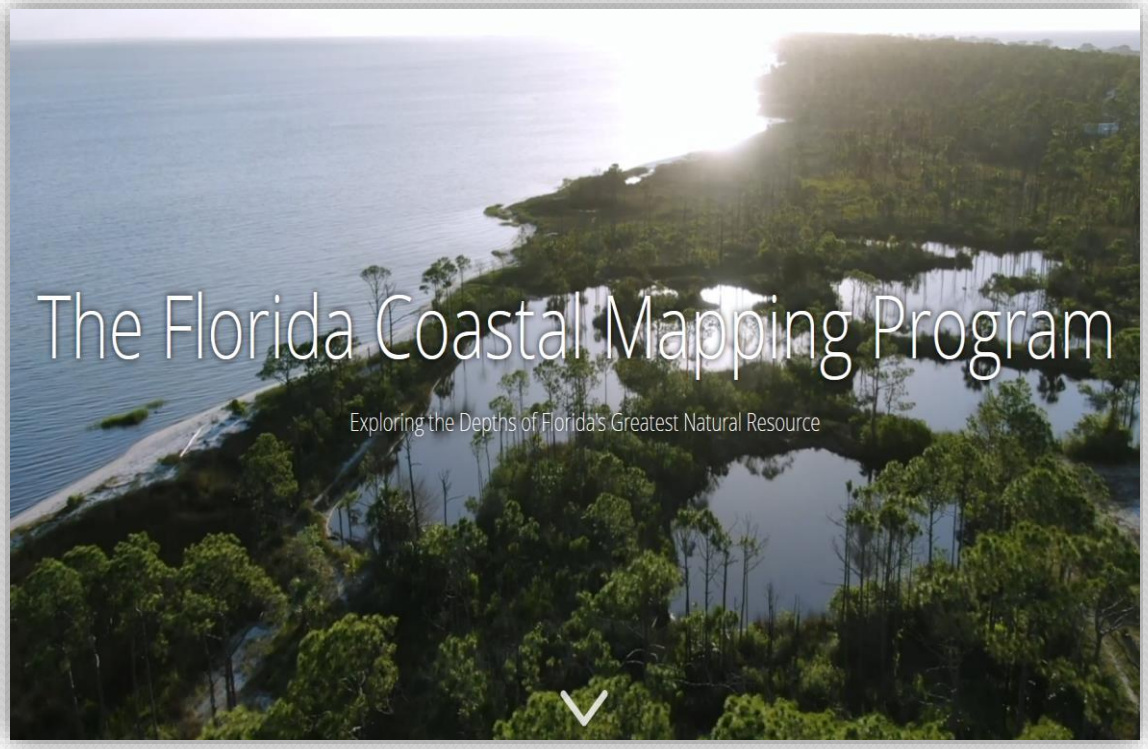
FGIO Florida Geographic Information Office

FGIO Initiatives

- State -

Florida Coastal Mapping Program - FCMaP

- An initiative with Florida agencies and participation from Federal agencies and institutions.
  - Assess existing data
  - Develop a prioritization strategy
  - Provide high-resolution data of the coastal shores and the shelf edge
- A comprehensive and coordinated approach
- Will support numerous applications
- FCMaP Summit on March 31 in St. Petersburg



FCMaP Storymap

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Florida Geographic Information Office

FGIO Initiatives

- State -

Statewide LiDAR Efforts

- Concurrent efforts for topo and bathy data collection
  - 3DEP
  - FCMaP
- Currently working with FDEM for Panhandle LiDAR acquisition post Hurricane Michael
- Statewide portal/repository for storing, visualizing, and acquiring datasets
  - Current size estimate of historical datasets ~22 terabytes
  - Mainly LAS but also DEMs and rasters

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Florida Geographic Information Office

FGIO Initiatives

- State -

Internship program

- Aiming to increase mentorship and educational opportunities

- Based on models from Southwest FL Water Management District

One Problem Florida Has…

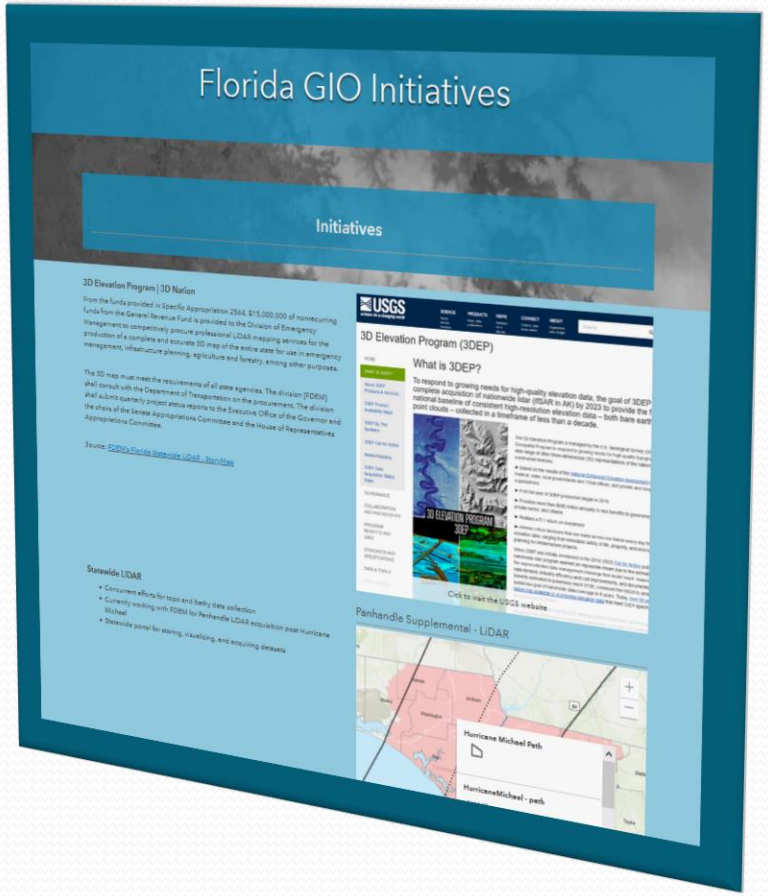
FGIO Hub

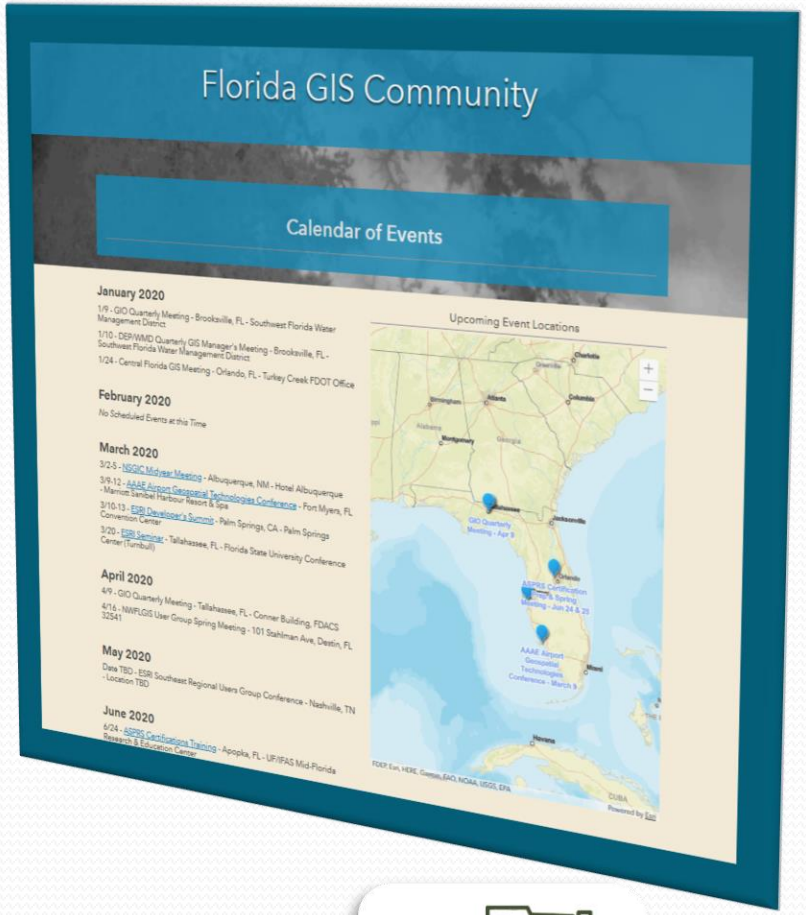
- About the Office
- FGIO Initiatives
- FL GIS Community & Events
- Statewide Geospatial Open Data Portal

FGIO Florida Geographic Information Office

https://www.floridagio.gov/

FGIO Hub





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Statewide Open Data Portal

Data Categories Include:

- Agriculture
- Biology
- Boundaries
- Climate, Meteorology & Atmosphere
- Economy
- Elevation
- Environment
- Geology
- Health
- Imagery & Basemaps
- Intelligence & Military
- Inland Waters
- Location
- Oceans
- Planning & Surveying
- Society
- Structure
- Transportation
- Utilities & Communication

Agencies and WMDs:

- FDACS
- FDEM
- FDEP
- FFWCC

- NWFWMD
- SRWMD
- SJRWMD
- SWFWMD
- SFWMD

FGIO Florida Geographic Information Office

https://geodata.floridagio.gov/

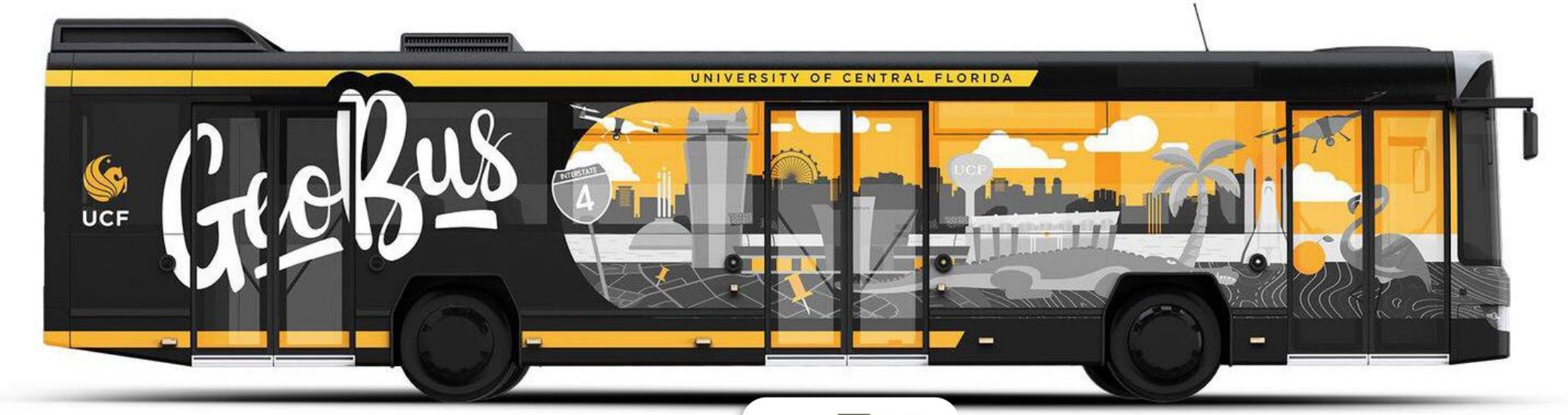
The GIS Community & Workgroups

GIS Day 2020

- **Wednesday, November 18**
- A worldwide event that celebrates the technology of Geographic Information Systems (GIS)

GeoBus™

- The nation's first-of-its-kind mobile geospatial technology experience
- 40 foot reclaimed city bus with a mobile citizen science laboratory focused on maps, apps, and drones that visits all K-12 schools in Florida.



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Florida Geographic Information Office

Discussion and Questions

FloridaGIO@FloridaDEP.GOV

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Kimberly.Jackson@FloridaDEP.GOV

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Florida Geographic Information Office

Aerial Photography
195.022, F.S.

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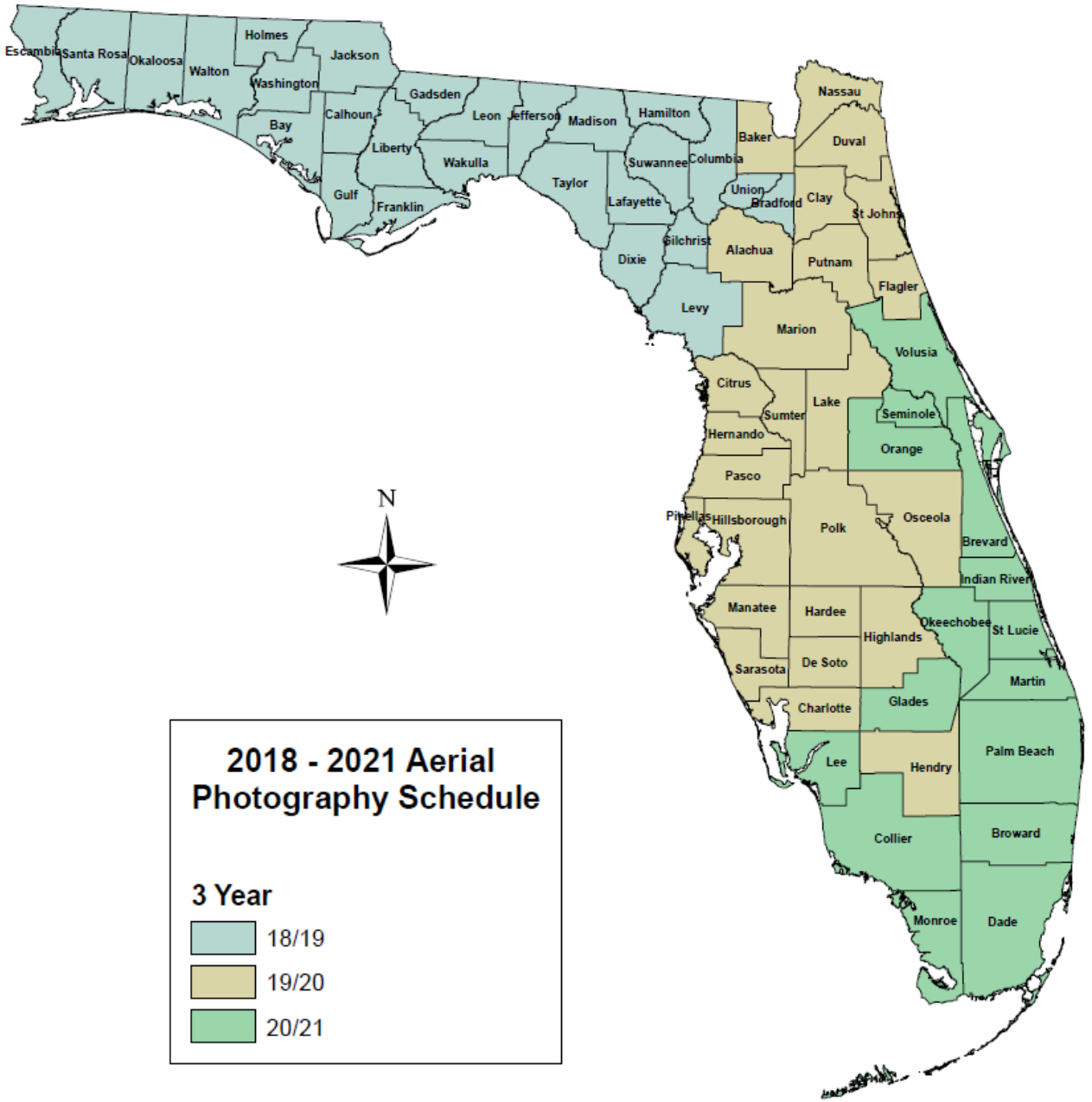
Aerial Photography
193.023, F.S.

(2) In making his or her assessment of the value of real property, the property appraiser is required to physically inspect the property at least once every 5 years. Where geographically suitable, and at the discretion of the property appraiser, the property appraiser may use image technology in lieu of physical inspection to ensure that the tax roll meets all the requirements of law. The Department of Revenue shall establish minimum standards for the use of image technology consistent with standards developed by professionally recognized sources for mass appraisal of real property. However, the property appraiser shall physically inspect any parcel of taxable or state-owned real property upon the request of the taxpayer or owner.



FCDOP Some Supporting Standards links

[2019 Florida County Digital Orthoimagery Program Standards]

[SURVEYING AND MAPPING HANDBOOK OCTOBER 10, 2016]

ASPRS Positional Accuracy Standards for Digital Geospatial Data (EDITION 1, VERSION 1.0. - NOVEMBER 2014)

http://www.asprs.org/a/society/committees/standards/Positional_Accuracy_Standards.pdf

FGDC-STD-014.2-2015

Geographic Information Framework Data Content Standard Part 2: Digital Orthoimagery

https://www.fgdc.gov/standards/projects/framework-data-standard/GI_FrameworkDataStandard_Part2

FGDC-STD-012-2002

Content Standard for Digital Geospatial Metadata: Extensions for Remote Sensing Metadata

https://www.fgdc.gov/standards/projects/csdgm_rs_ex/MetadataRemoteSensingExtens.pdf

FDOT CIM
CIVIL INTEGRATED MANAGEMENT

Executive Order 12906 of April 11, 1994

- Section 1. Definitions.
- (a) ‘‘**National Spatial Data Infrastructure**’’ (‘‘NSDI’’) means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.

- (b) ‘‘**Geospatial data**’’ means information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.

Framework is a set of common themes of geospatial data that provide the basic data "skeleton" needed by users of Geographic Information Systems (GIS). The data layers that make up the Framework are the bones on which state agencies, local and county governments, tribal governments, academic GIS users, and the private sector can build their own GIS data. Framework data layers are intended to be made available to the user community as freely and as easily as possible.

NATIONAL SPATIAL DATA INFRASTRUCTURE FRAMEWORK DATA

What is Framework

Framework is a set of common themes of geospatial data that provide the basic data "skeleton" needed by users of Geographic Information Systems (GIS). The data layers that make up the Framework are the bones on which state agencies, local and county governments, tribal governments, academic GIS users, and the private sector can build their own GIS data. Framework data layers are intended to be made available to the user community as freely and as easily as possible.

Key aspects of Framework:

- Seven themes of most commonly used digital geospatial data
- Procedures, technology, and guidelines that provide for integration, sharing, and use of these data.
- Institutional relationships and business practices that encourage the maintenance and use of data.

Key benefits of Framework:

- Facilitate production and use of geographic data
- Reduce overall operating costs for geographic data clients
- Improve service and decision-making

next Topic

Seven Thematic Elements of Framework

Quick Facts

Although the Framework concept had been discussed since the 1970s, 1996 marked the first year that the FGDC began funding Framework related projects

The Bigger Picture

The ultimate goal of Framework and the Framework Data Content Standards is to provide uniformity to data and data sources. In doing so data becomes accessible to more users, and reduces cost in data redundancy.

Course Home

FAQ

Glossary

References

NSDI

Our webinar will focus on two Elements of the NSDI Framework

Orthoimagery

&

Elevation

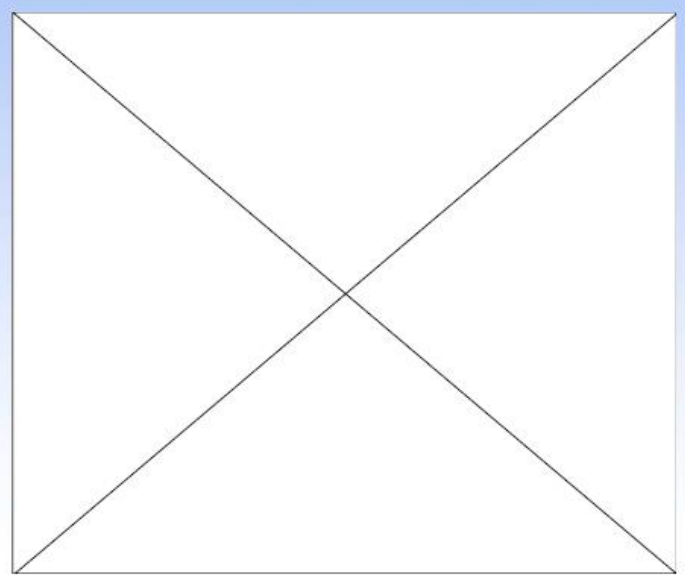
NATIONAL SPATIAL DATA INFRASTRUCTURE FRAMEWORK DATA

Seven Thematic Elements of Framework

Geographic data users from many disciplines have a recurring need for a few themes of basic data:

- Cadastral information
- Orthoimagery
- Elevation
- Geodetic control
- Hydrography
- Governmental units
- Transportation

Many organizations produce and use such data every day. These themes comprise the core geospatial data used by most Geographic Information Systems (GIS) applications. Essentially, the NSDI seeks to assemble this basic geospatial data nationwide and the Framework is the foundation for this effort.



next Topic

Framework Theme: Cadastral

Course Home

FAQ

Glossary

References

NSDI

Digital

Orthoimagery

NATIONAL SPATIAL DATA INFRASTRUCTURE FRAMEWORK DATA

Framework Theme - Digital Orthoimagery

Digital orthoimagery is georeferenced images of the Earth's surface, collected by a sensor in which image object displacement has been removed for sensor distortions and orientation and for terrain relief.

Many geographic features, including those that are part of the Framework, can be interpreted and compiled from an orthoimage. Orthoimages can also serve as a backdrop to reference the results of an application to the landscape. The Framework may include imagery that varies in resolution from sub meter to tens of meters. Accurately positioned, high-resolution data (pixels of 1 meter or finer) are presumed to be the most useful for supporting the compilation of Framework features, particularly those that support local data needs.

DIGITAL ORTHOIMAGERY DATA EXAMPLE

next Topic

Framework Theme: Elevation

Course Home

FAQ

Glossary

References

NSDI

What is Elevation

Elevation

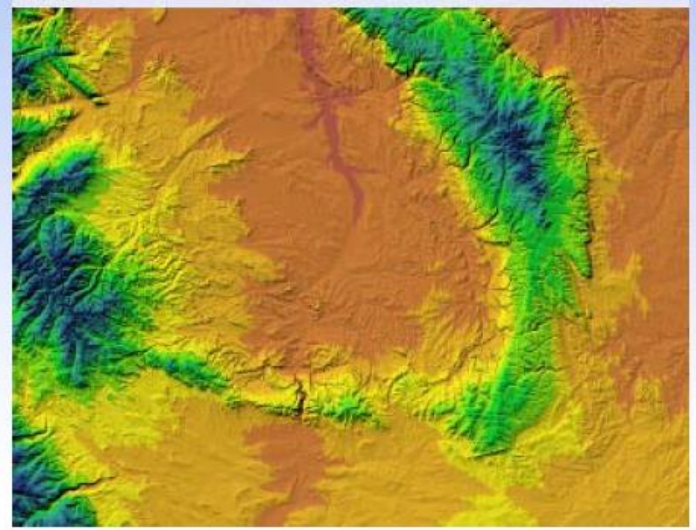
NATIONAL SPATIAL DATA INFRASTRUCTURE FRAMEWORK DATA

Framework Theme - Elevation

Elevation data provides information about terrain. Elevation refers to a spatially referenced vertical position above or below a datum surface. The Framework includes the elevations of land surfaces and the depths below water surfaces (bathymetry). Elevation and bathymetry may be modeled in various forms, such as in an evenly spaced grid or as irregularly spaced points (triangulated irregular network, hypsography, mass points).

Elevation data are used in many different applications. Users may want a representation of the terrain, such as a contour map, spot elevations, or a three-dimensional perspective view. Elevation data are also used to build models and perform applications, ranging from line-of-sight calculations, to road planning, to water runoff. Elevation data are also combined with other data themes in applications and mapping.

ELEVATION DATA EXAMPLE



next Topic

Framework Theme: Geodetic Control

Course Home

FAQ

Glossary

References

NSDI

ISO 19115-2 - Grid Data and Imagery

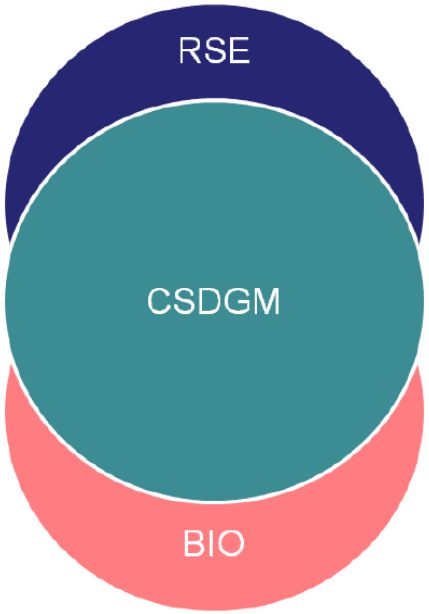
Metadata for Sensor, Platform and Trajectory

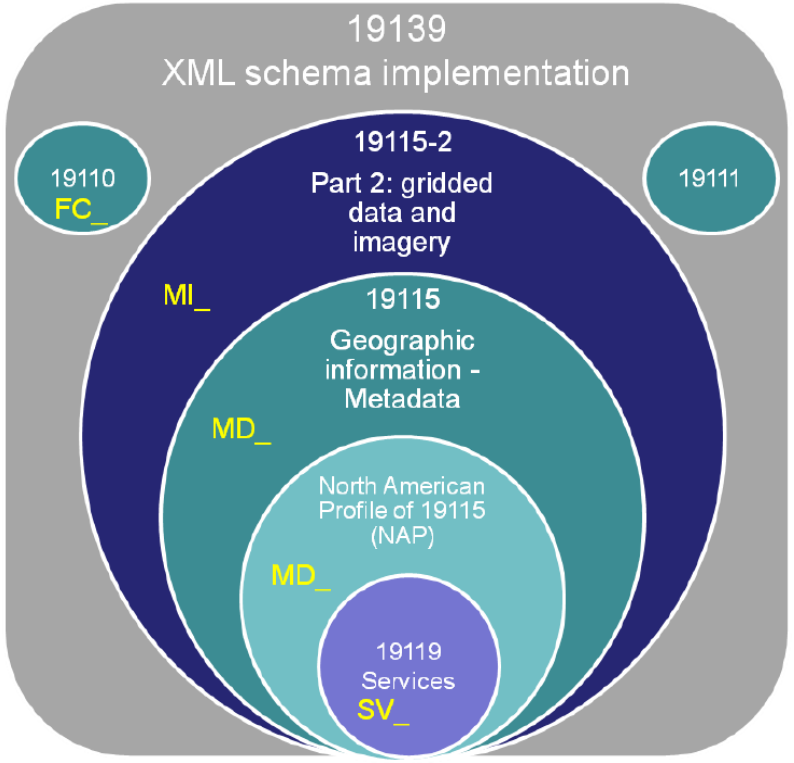
Understanding the instrumentation is often important when using remotely sensed data. A new section has been added with **metadata** describing the physical positions and properties of the platform and instrument. Provisions are made to describe the platform orbit or flight path, the orientation of the instrument relative to the platform, the direction and change with time of the field of view. There is also provision for a description of the instrument calibration.

Liping Di[*], Barry M. Schlesinger[*], Ben Kobler[**]
Working Group C#/G#

Comparing FGDC and ISO Standards

The content of **ISO 19115-2** strongly resembles the sections of the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) Remote Sensing Extensions (RSE). The following information is **new** with ISO/NAP:





- Far more flexible.
- Depict relationships between datasets and collection level (parent/child relationships).
- Standardizes descriptors through the use of codelists.
- Accommodates new technologies (such as the ability to document services).
- Accommodates international scope.

Aerial Photography
195.022, F.S.

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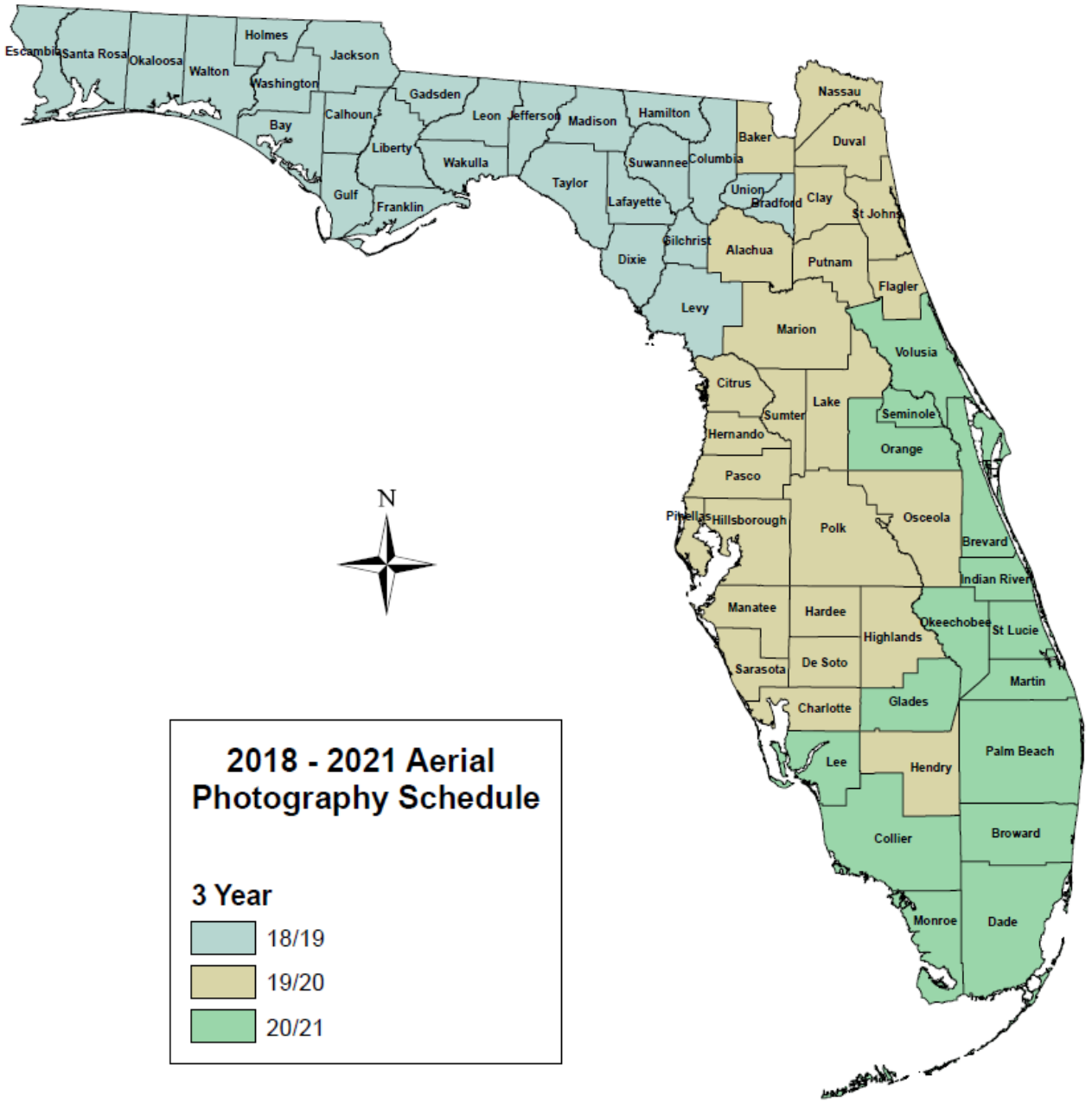


5J-17.062 on Digitally signed Survey Report

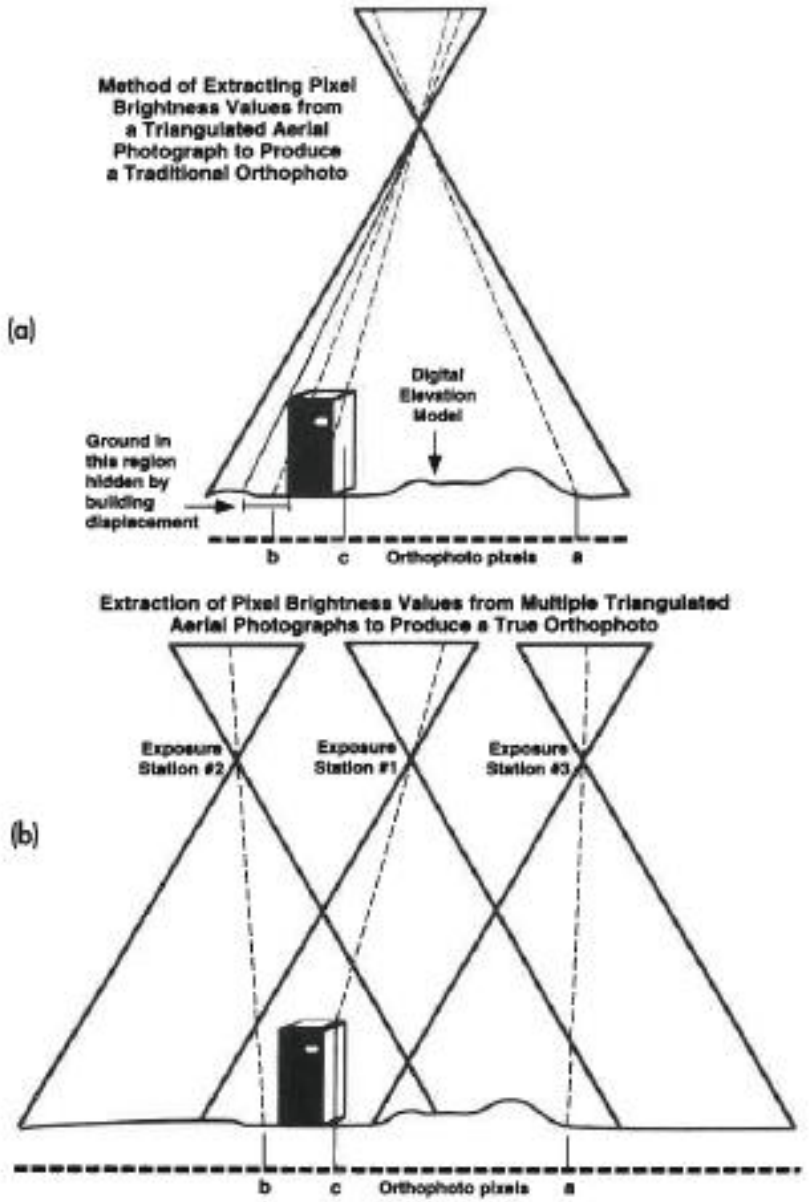
5J-17.062 Procedures for Signing and Sealing Electronically Transmitted Surveys or Other Documents.
(1) **Information stored in electronic files** representing plans, specifications, plats, reports, or other documents which must be sealed under the provisions of chapter 472, F.S., shall be signed, dated and sealed by the professional surveyor and mapper in responsible charge.

(2) **A license holder may use a computer-generated representation of his or her seal on electronically conveyed work**; however, the final hard copy documents of such surveying or mapping work must contain an original signature and seal of the license holder and date or the documents must be accompanied by an electronic signature as described in this section. A scanned image of an original signature shall not be used in lieu of an original signature and seal or electronic signature. Surveying or mapping work that contains a computer-generated seal shall be accompanied by the following text or similar wording: "The seal appearing on this document was authorized by [Example: Leslie H. Doe, P.S.M. 0112 on (date)]" unless accompanied by an electronic signature as described in this section.

(3) **An electronic signature is a digital authentication process** attached to or logically associated with an electronic document and shall carry the same weight, authority, and effect as an original signature and seal. The electronic signature, which can be generated by using either public key infrastructure or signature dynamics technology, must be as follows:
(a) Unique to the person using it;
(b) Capable of verification;
(c) Under the sole control of the person using it;
(d) Linked to a document in such manner that the electronic signature is invalidated if any data in the document are changed.

(4) Alternatively, electronic files may be signed and sealed by creating a "signature" file that contains the surveyor and mapper's name and PSM number, a brief overall description of the surveying and mapping documents, and a list of the electronic files to be sealed. Each file in the list shall be identified by its file name and secure authentication code computed by a cryptographic hash function. A report shall be created that contains the surveyor and mapper's name and PSM number, a brief overall description of the surveyor and mapper documents in question and the secure authentication code of the signature file. This report shall be printed and manually signed, dated, and sealed by the professional surveyor and mapper in responsible charge. The signature file is defined as sealed if its secure authentication code matches the secure authentication code on the printed, manually signed, dated and sealed report. Each electronic file listed in a sealed signature file is defined as sealed if the listed secure authentication code matches the file's computed secure authentication code.

True Orthoimagery at Building & Bridges



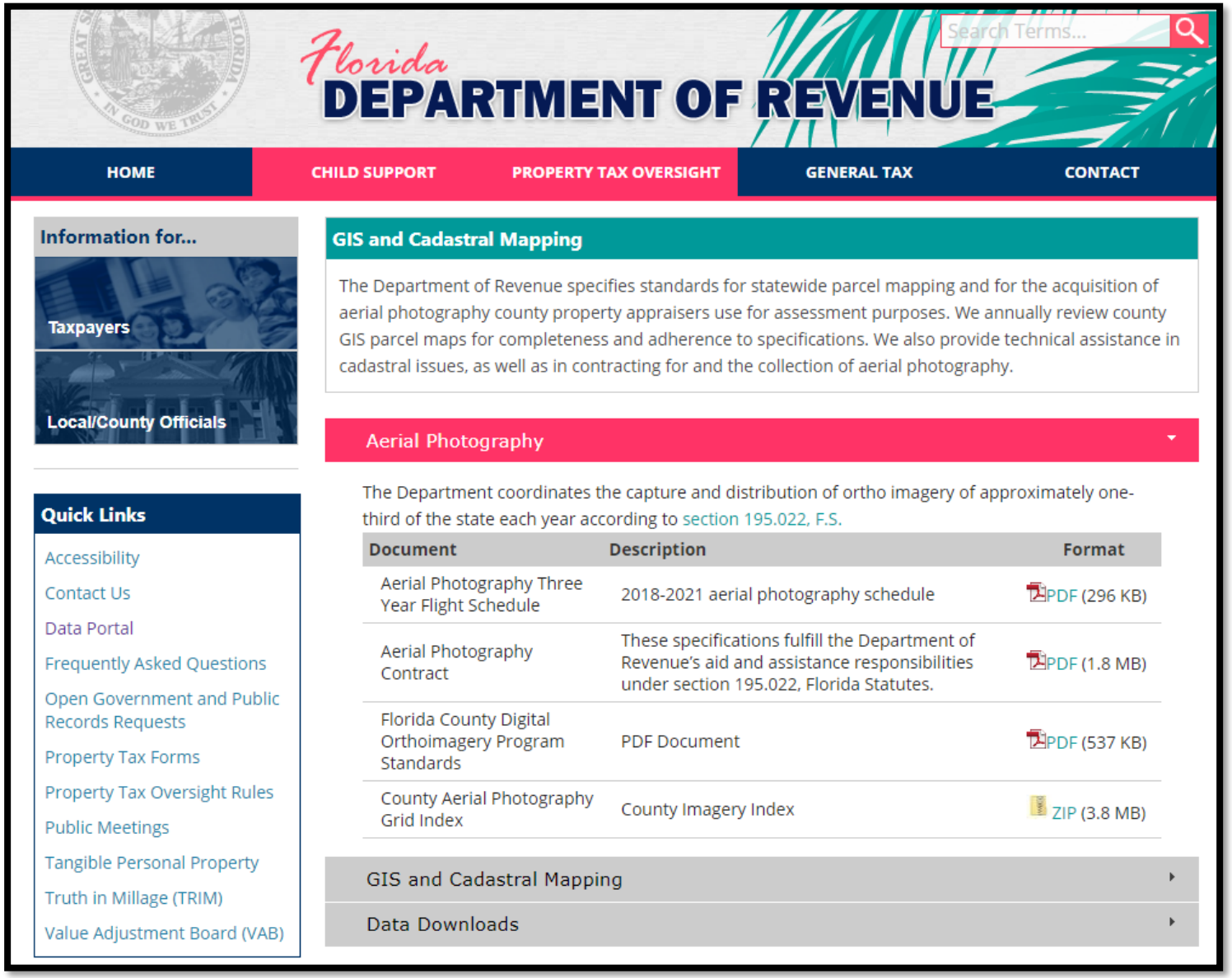
An elegant solution to the above orthophoto problems was recently developed (Southard, 1994). In Figure 9b we see three triangulated aerial photographs and a DEM covering the entire footprint of the project area. Using traditional 3D stereoscopic feature extraction tools, the outlines of buildings, bridges, and other obstructions are identified. However, the brightness value gray shade for pixel *"a"* is interpolated from the most nadir (directly overhead) camera station (#3 in Figure 9b) that has the best view of the ground at location *"a"*. The algorithm then examines the DEM and feature data and determines that the view of the ground for pixel *"b"* is obscured by the building at camera station 1 and automatically selects imagery from camera station 2 to obtain the proper pixel color for pixel *"b"*. Likewise the algorithm determines that a building resides over the location of pixel *"c"* in camera station 2 and will choose camera station 1 as the source of gray shades (of the roof) for pixel *"c"*. The application of these algorithms results in a 'true orthophoto' in which:

- building rooftops are shown in their correct planimetric x,y location;
- sides of buildings are not shown;
- ground on all sides of all buildings is shown in its proper location;
- tops and bottoms of overpasses are shown in their proper locations;
- there is no need to falsify elevation data to produce esthetically acceptable orthoimages, and
- orthophotos and map sheets can be made that are larger than any of the input images.

Florida Department of Revenue FCDOP Standards

- County Aerial Photography Grid Index
- Aerial Photography Three Year Flight Schedule
- Aerial Photography Contract
- Florida County Digital Orthoimagery Program Standards

https://floridarevenue.com/property/Pages/Official_GIS.aspx



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Orthoimagery Deliverables – Naming Convention

5.1 File Formats and Image Types

- **Tile Index Map**
- **Images**
- **Surface Data**
- **Reports**

Tiles will be contiguous and non-overlapping and will be suitable for creating a seamless image mosaic that includes no data void cells or gaps. Tile naming convention is as follows:

YYYY__NNNNNN.TIF *(4Band Imagery, **Required**)*
YYYY__NNNNNN_RGB.TIF *(Natural Color Imagery **if requested**)*
YYYY__NNNNNN_CIR.TIF *(Color Infrared Imagery **if requested**)*

YYYY__NNNNNN.DEM *(Surface data used for orthorectification, **Required**)*
Surface file name will correspond to image tile

Where:
YYYY = Ending year of the flying season that typically ends in March.
NNNNNN = *A*ppropriate tile (cell) index number values from project tiling index provided.

The following examples represent the three-color variations of the same Orthoimagery image tile that was acquired during the 2019– 2020 flying season.

2020_313632.tif *(4Band Image Tile **Required**)*
2020_313632_RGB.tif *(Natural Color Image Tile **if requested**)*
2020_313632_CIR.tif *(Color Infrared Image Tile **if requested**)*

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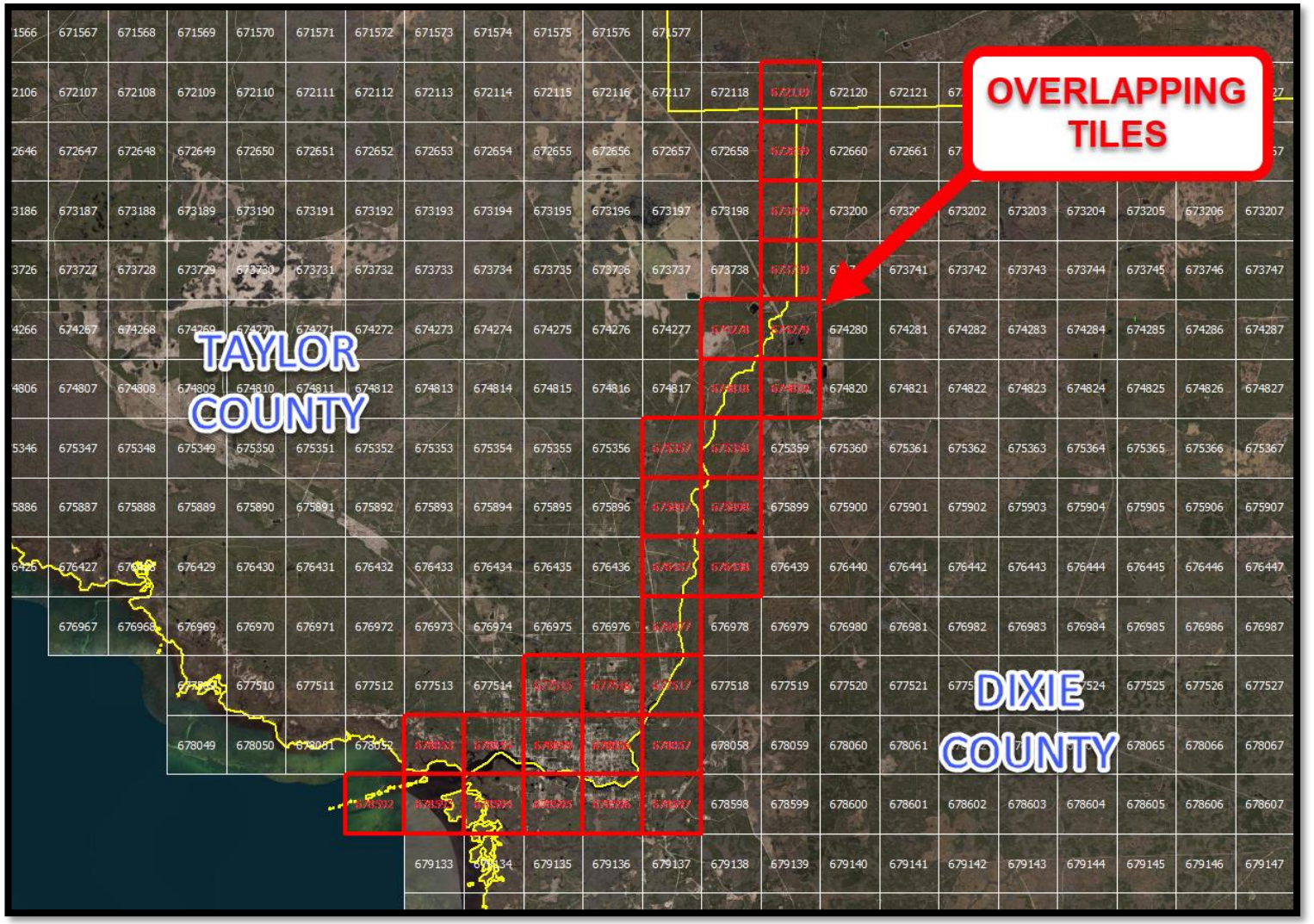
Orthoimagery Tile Deliverables

- Orthoimagery tiles will be sorted and delivered by County
- Overlapping tiles will be delivered in both sets of individual County data.
- The Florida Imagery Index available at the FDOR website

https://floridarevenue.com/property/Pages/Cofficial_GIS.aspx



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Orthoimagery Tile Index

- Digital files (ESRI Shape file format)
- 1 Index Shapefile per county. No combined tile indices.
- The Florida Imagery Index available at the FDOR website

https://floridarevenue.com/property/Pages/Official_GIS.aspx

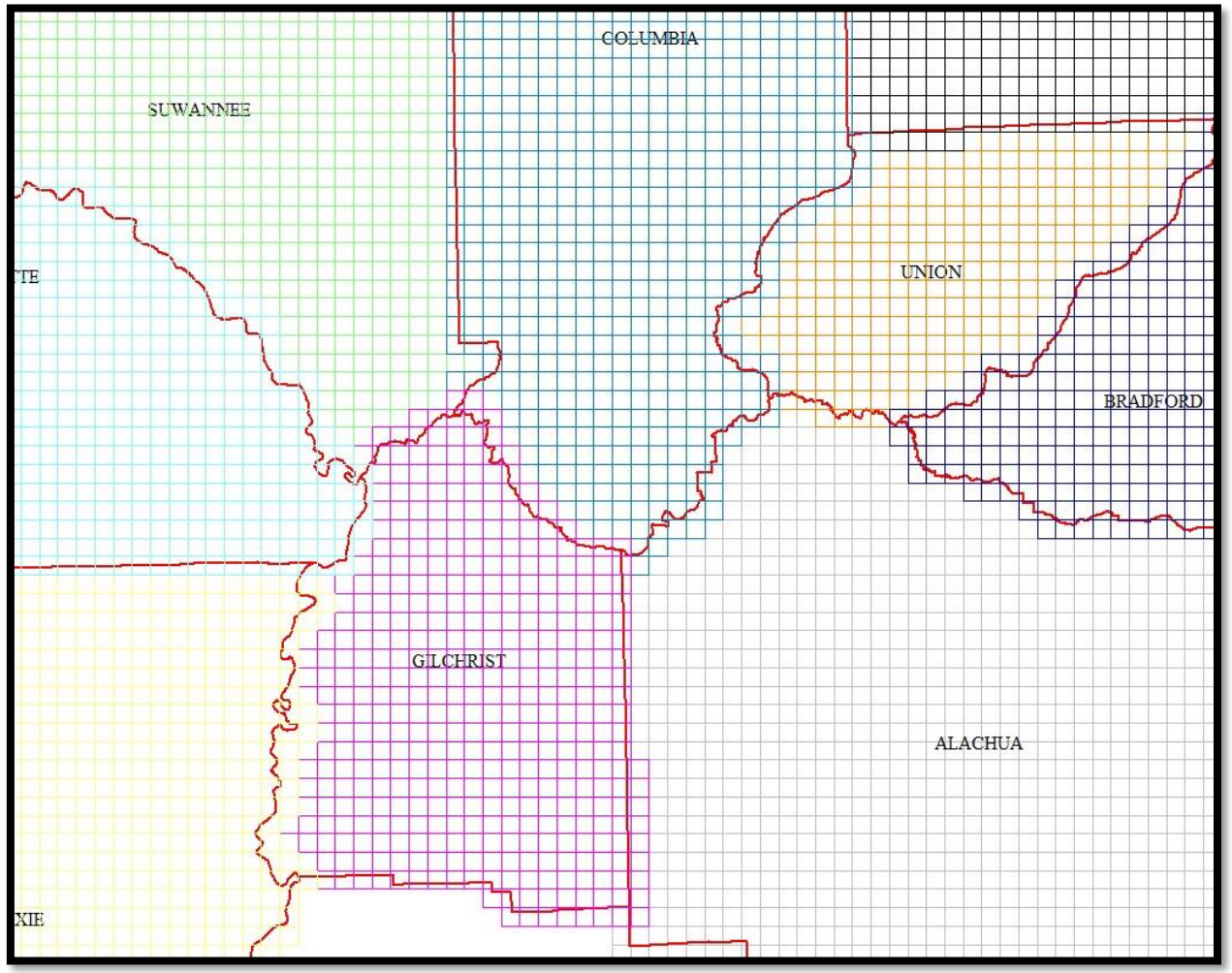

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Image Seamline Feature Class

Image Seamline Feature Class

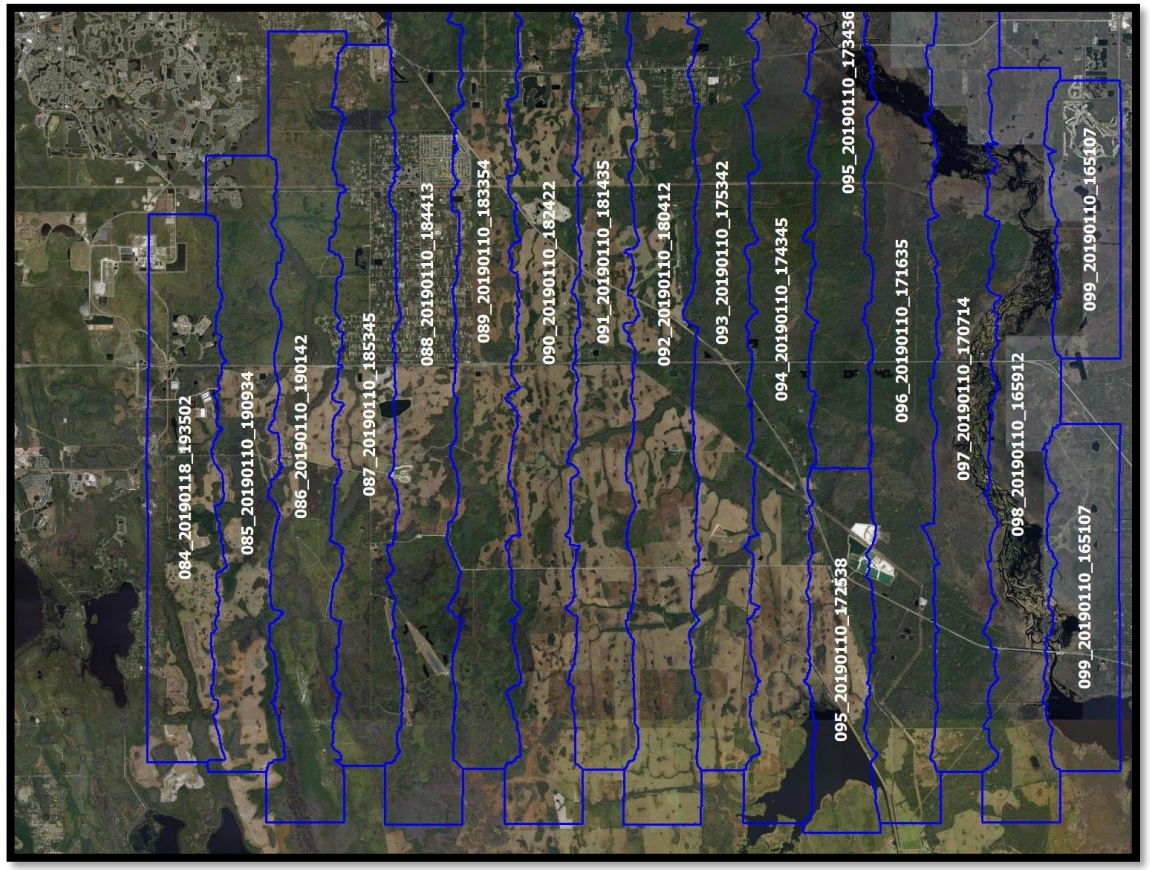
- "ProjectName_Seamlines"
- Closed Polygons

FRAME
CAMERA

	FID	Shape	NAME	DOF	EXPOSURE	TIMESTAMP	HEIGHT
	0	Polygon	035_0067	12-Feb-2016	6409_035_0067	19:14:59	4525
	1	Polygon	033_0067	12-Feb-2016	6409_033_0067	19:40:01	4516
	2	Polygon	016_0041	17-Feb-2016	6409_016_0041	16:09:09	4562
	3	Polygon	017_0067	17-Feb-2016	6409_017_0067	15:53:49	4576
	4	Polygon	019_0067	17-Feb-2016	6409_019_0067	15:27:24	4566
	5	Polygon	023_0067	13-Feb-2016	6409_023_0067	17:14:11	4567
	6	Polygon	018_0042	17-Feb-2016	6409_018_0042	15:42:43	4590
	7	Polygon	015_0067	17-Feb-2016	6409_015_0067	16:20:22	4578
	8	Polygon	032_0041	12-Feb-2016	6409_032_0041	19:55:05	4505
	9	Polygon	029_0067	13-Feb-2016	6409_029_0067	15:53:47	4537
	10	Polygon	022_0041	13-Feb-2016	6409_022_0041	17:29:45	4506
	11	Polygon	021_0067	13-Feb-2016	6409_021_0067	17:40:42	4507

Image Seamline Feature Class

- “ProjectName_Seamlines”
- Closed Polygons



PUSHBROOM SENSOR

FID	SHAPE	IMAGE	DOF	START TIME	END TIME	HEIGHT
0	POLYGON	088_20190110_184413	5-Feb-19	11:05:04	11:06:55	1341
1	POLYGON	092_20190110_180412	5-Feb-19	11:11:58	11:14:19	1341
2	POLYGON	086_20190110_190142	5-Feb-19	11:20:15	11:22:52	1341
3	POLYGON	090_20190110_182422	5-Feb-19	11:27:33	11:30:27	1341
4	POLYGON	096_20190110_171635	5-Feb-19	11:35:23	11:38:34	1341
5	POLYGON	094_20190110_174345	5-Feb-19	11:42:58	11:46:09	1341
6	POLYGON	098_20190110_165912	5-Feb-19	11:50:38	11:54:04	1341
7	POLYGON	095_20190110_172538	5-Feb-19	11:58:14	12:01:55	1341
8	POLYGON	085_20190110_190934	5-Feb-19	12:07:12	12:12:53	1336
9	POLYGON	097_20190110_170714	5-Feb-19	12:15:22	12:20:19	1336
10	POLYGON	099_20190110_165107	5-Feb-19	12:24:15	12:29:13	1336
11	POLYGON	099_20190110_165107	5-Feb-19	12:32:35	12:37:30	1336
12	POLYGON	093_20190110_175342	5-Feb-19	12:41:16	12:46:13	1336
13	POLYGON	091_20190110_181435	5-Feb-19	12:49:38	12:54:21	1336
14	POLYGON	089_20190110_183354	5-Feb-19	12:57:18	13:02:46	1336
15	POLYGON	087_20190110_185345	5-Feb-19	13:05:18	13:10:46	1333
16	POLYGON	084_20190118_193502	5-Feb-19	13:13:18	13:18:46	1333

Surface Model Deliverables

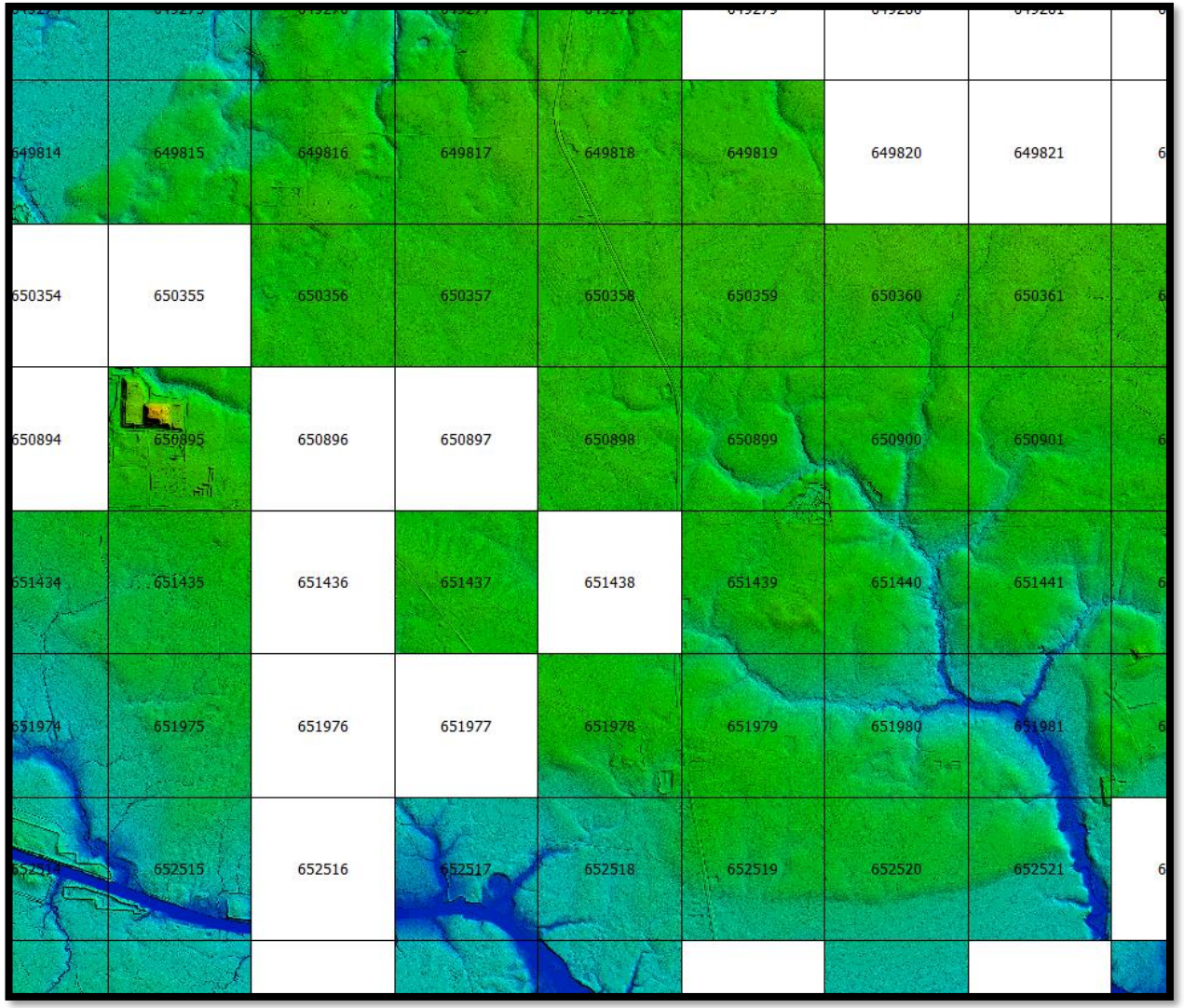
- Surface data will be delivered in tiles that correspond to orthoimagery
  5000 x 5000 orthoimagery index

- **Acceptable Formats:**
  USGS DEM
  Raster GeoTIFF
  ERDAS IMAGINE (IMG) Format
  Floating Point Raster File (.flt)

A Digital Elevation Model adequate to support accuracy specifications identified for this project **must be created to accurately orthorectify photographic imagery**.

The Consultant is responsible for evaluating the accuracy of the DEMs, and **when necessary shall collect additional surface information to accurately orthorectify photographic imagery**.

The Consultant will submit information in the final survey report and metadata which documents the source, enhancements made, and density of the DEMs utilized for the Orthoimagery mapping project.



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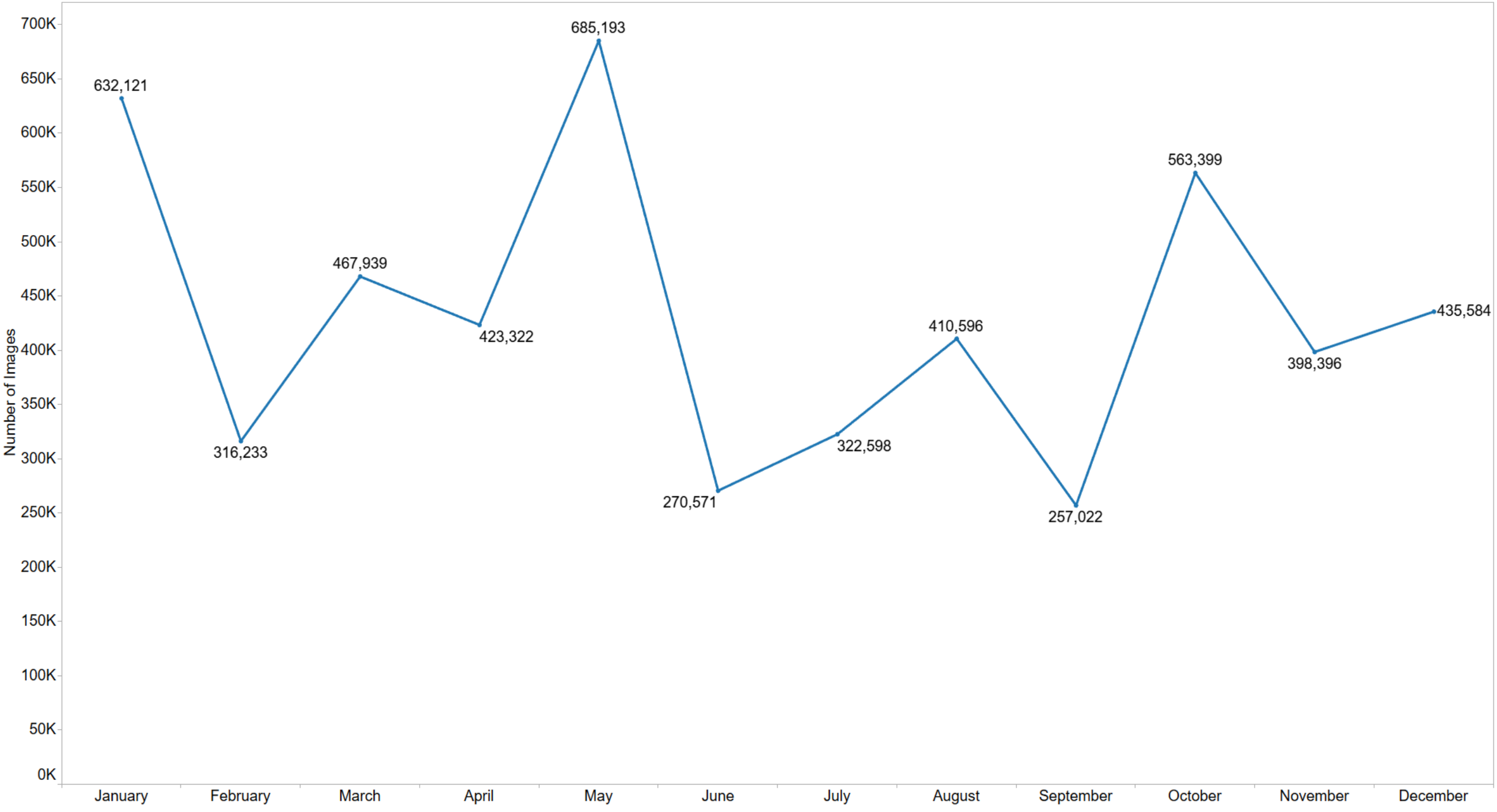
Meeting Challenges Today and the Future

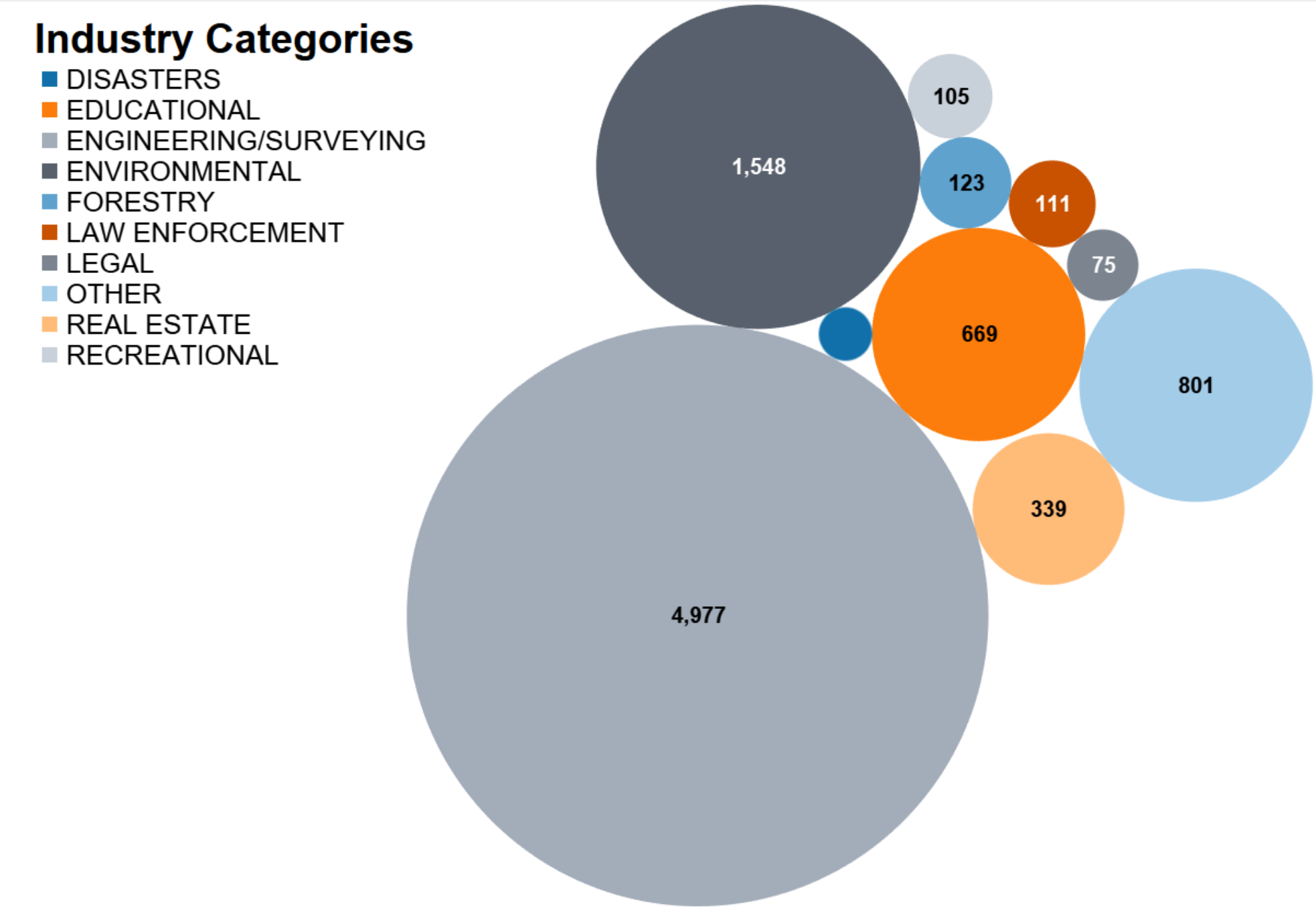
Leveraging Emerging Technologies for Survey and Mapping

Ryan Rittenhouse, February 2020

Aerial Images Delivered 2019

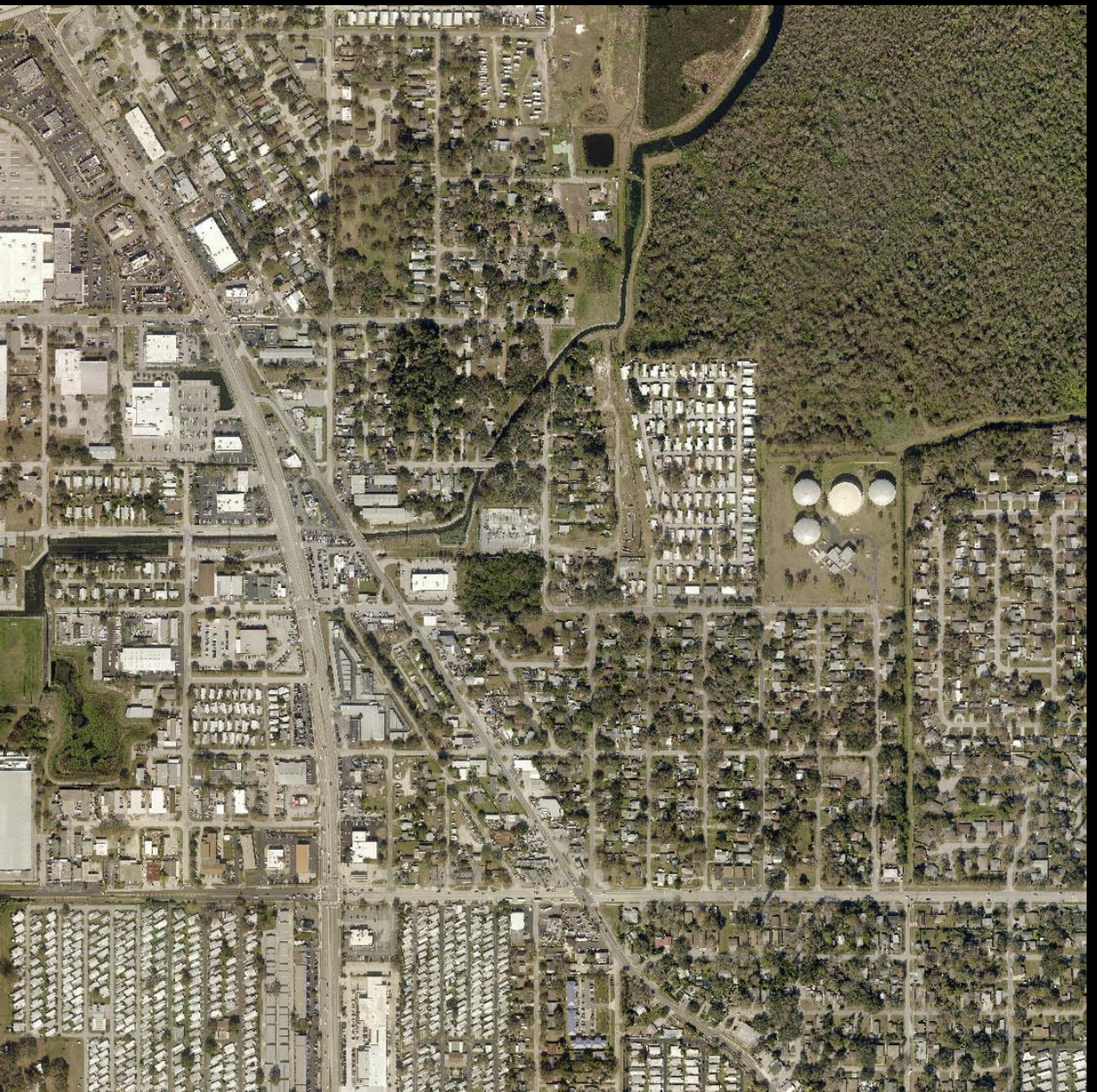


Bulk Image Requests By Industry 2019

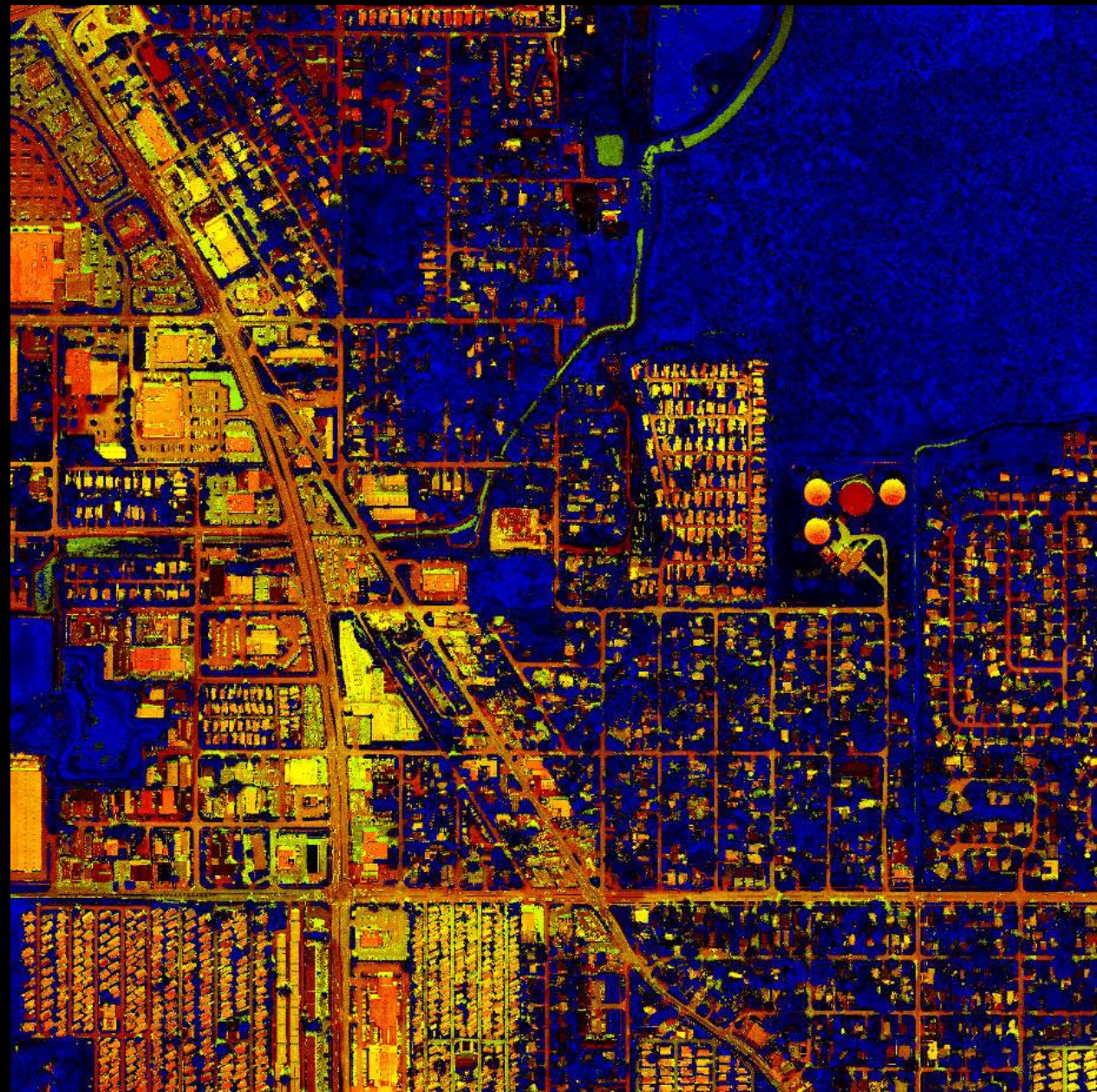


Esri's Living Atlas of the World

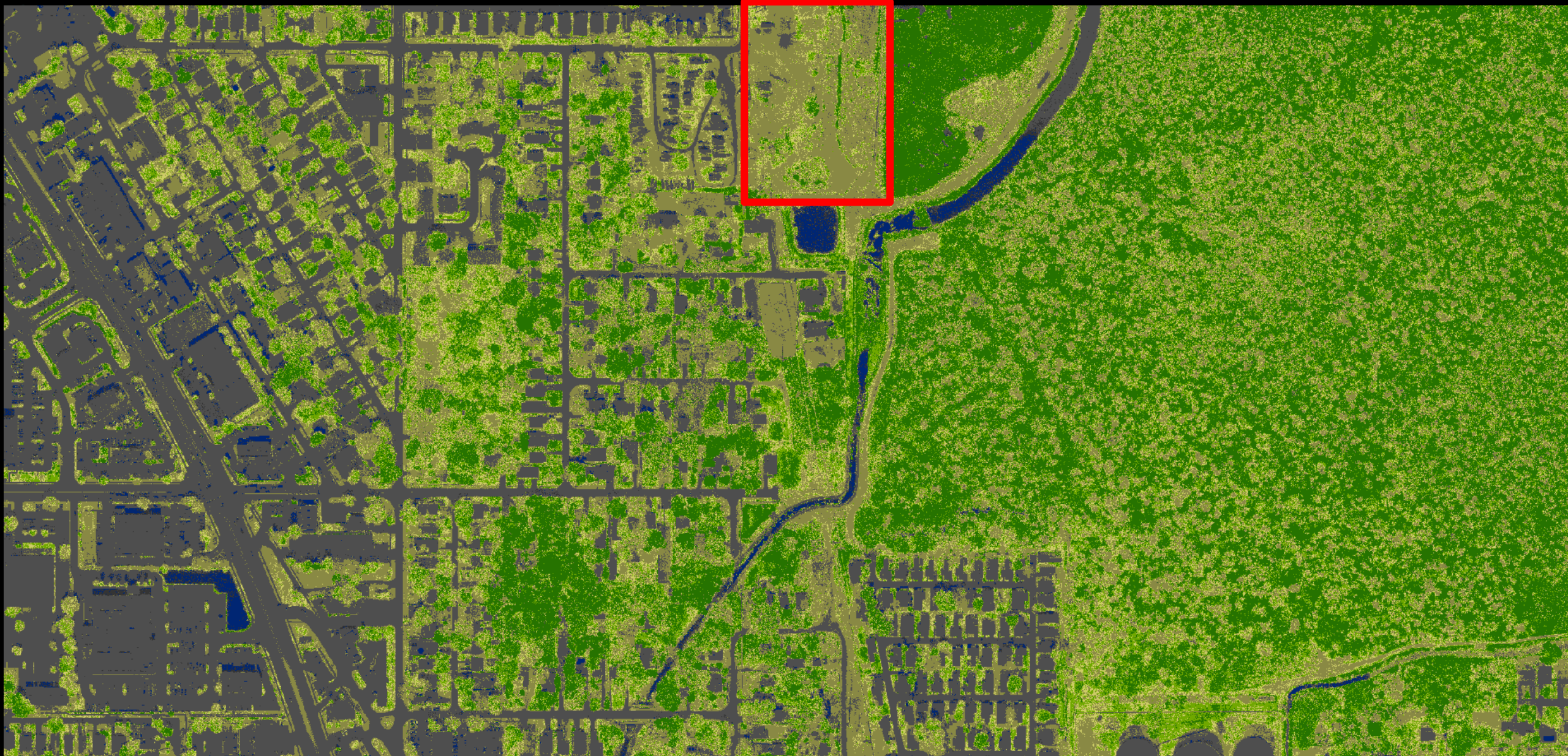
Natural Color



False Color with Near Infrared

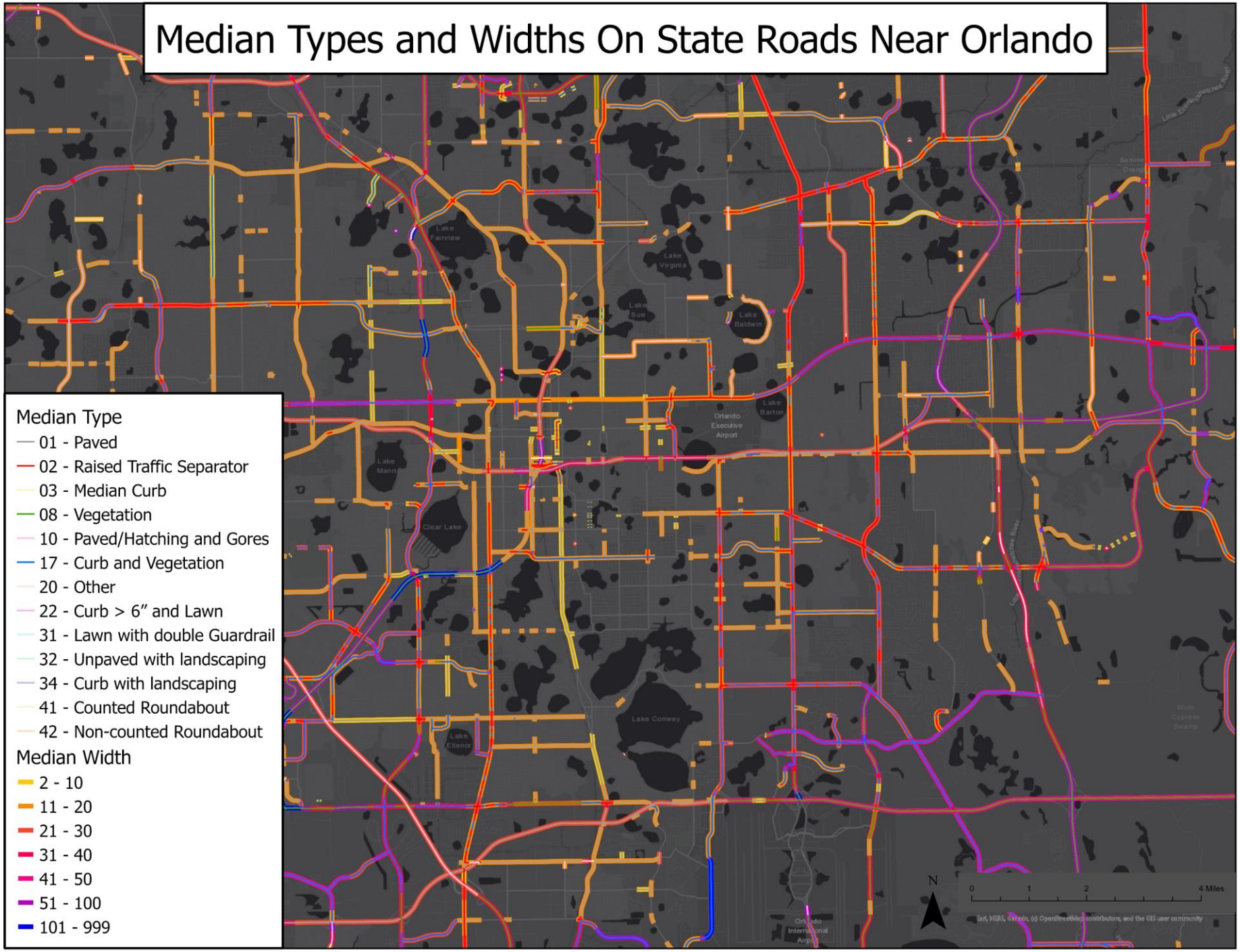


Normalized Difference Vegetation Index



Land Cover Classification

Median Types and Widths On State Roads Near Orlando



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Questions?

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